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Maritime Domain Awareness (MDA) Workflow Model Status Report

by

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13. ABSTRACT (Maximum 200 words.)

The Naval Postgraduate School was contracted by OPNAV N3/N5 to define identify and help to fill gaps in the MDA capability, especially with respect to MDA Spiral 1 systems. This status report presents: (1) The sources and methods we used to identify the current ("as is") concerns and processes of a sample of organizations that execute Maritime Domain Awareness (MDA) activities. (2) The products of that study: a list of issues of concern to MDA stakeholders, and a set of MDA workflow diagrams. (3) Initial recommendations to enhance MDA capability given likely impact of Spiral 1 technologies on the current processes.

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Table of Contents

1. Executive Summary

The new mission of Maritime Domain Awareness requires the Navy to develop and refine Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) that supports acquisition for MDA. The Naval Postgraduate School is supporting the Navy in this effort by iteratively defining MDA tasks MDA DOTMLPF.

The objective of the present study was to define the current – or "as is" – flow of MDA tasks in a representative sample of organizations, and to capture issues of concern to those organizations regarding MDA Spiral 1 technologies.

The NPS research team elicited information about workflow and technology-related issues in interviews with CINCPACFLT, MIFCPAC, ONI, and NAVCENT. We conducted two types of analyses using interview data.

A qualitative analysis was performed to identify areas of concern (above, sections 3.2) and generate recommendations (see section 4).

A process analysis was performed to define (1) MDA tasks, (2) the entities that execute them, (3) the precedence relationships (or flow) between those tasks, and, when possible, (4) the media used to communicate between tasks, (5) the products of those tasks, (6) the potential application points for Spiral 1 technologies (see section 5). The NPS research team developed a diagram that represented the "as is" workflow. NAVNETWARCOM (through its contractors WBB Inc. and Booz Allen Hamilton) used these data and elaborated on them to create DoDAF OV-6c diagrams of MDA activities. Representatives of more than 20 organizations reviewed and revised the workflow products in two workshops.

We make approximately 20 recommendations based on these analyses. These recommendations concern training, provisioning, evaluation, management of technology enabled processes, and other issues. We recommend that the Navy build upon this work in the following ways:

- Conduct technology assessments that focus on human factors issues: trainability, usability, utility, and the fit between technology, organizational structure, and processes.
- Extend the current "as-is" analysis to define MDA "to-be" procedures that (1) conform to the MHQ w/MOC (Maritime Headquarters with Maritime Operational Center) and ONI (Office of Naval Intelligence) and ONI process architectures and (2) are customized to the needs of specific users.
- Develop instruments and techniques for monitoring, measuring, and managing workflow at critical junctures in the MDA process.
- Implement a program to define a rapid, tailorable technology training program and measure its effectiveness. Adapt both the training and technology accordingly.

NPS will proceed with its planned assessment activities under the current contract. This includes collecting and refining objectives; as well as defining each objective's goals,

guiding questions, system requirements, measures to be recorded, and data collection plan. This will be placed for each objective into a retrievable data base: FIRE (FORCEnet Innovation Research Enterprise).

We look forward to feedback from readers of this status report.

2. Overview

Maritime Domain Awareness is a prime example of the new generation of systems engineering programs in which the requirements are not fully defined at the outset. Rather, requirements are refined and solutions are developed iteratively through test and demonstration events, and through continuous fielding and feedback. Requirements, in enterprise-wide programs such as MDA, mean the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) required to achieve the desired capability: Maritime Domain Awareness. To define such requirements (DOTMLPF), NPS applies a mature process for designing, conducting, and reporting test and demonstration events. This process defines the workflow – the activities that constitute Maritime Domain Awareness – and metrics for evaluating the insertion of solutions – MDA Spiral 1 technologies. It applies a rigorous process for defining assessment events – demonstrations and tests. This process iteratively refines DOTMLPF, as illustrated in Figure 1.

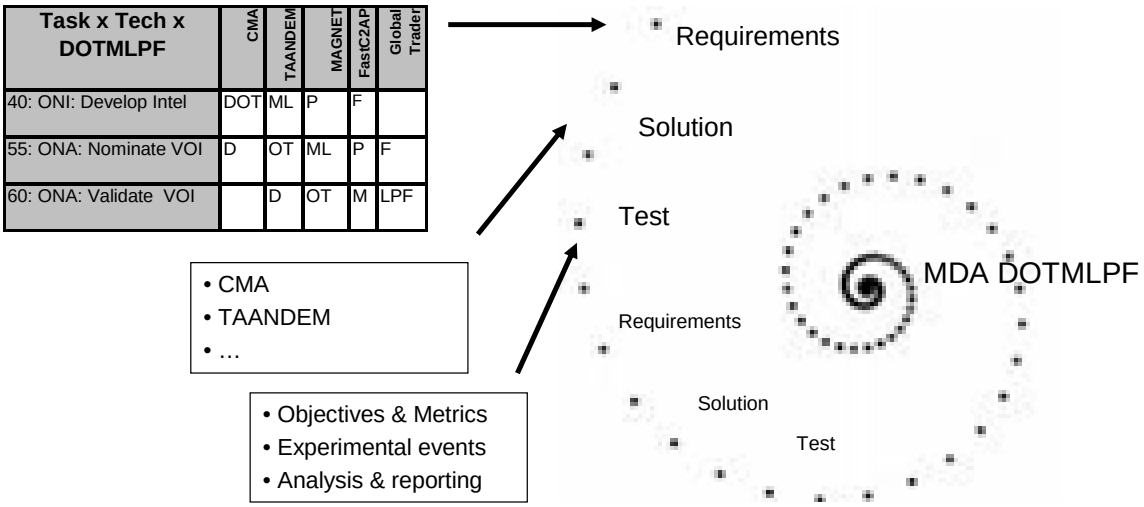

Figure 1: The NPS assessment process iteratively refines MDA DOTMLPF by defining objectives and metrics of the Spiral 1 impact on MDA workflow

The workflow of MDA must be defined to support this process of refining MDA DOTMLPF. Under contract to OPNAV N3/N5, NPS conducted an analysis of MDA processes as they currently exist and identified potential concerns about the impact of Spiral 1 technologies on that process. This status report documents the findings of that analysis. Specifically, this report presents:

- The sources and methods we used to identify the current ("as is") concerns and processes of a sample of organizations that execute Maritime Domain Awareness (MDA) activities.
- The products of that study: a list of issues of concern to MDA stakeholders, and a set of MDA workflow diagrams.

- Initial recommendations to enhance MDA capability given likely impact of Spiral 1 technologies on the current processes.

3. Method

In this chapter, we define the sources and methods of the information developed in this study.

3.1. Method Overview

The objective of the present study was to define the current – or "as is" – flow of MDA tasks in a representative sample of organizations, and to capture issues of concern to those organizations regarding MDA Spiral 1 technologies.

The NPS research team elicited information about workflow and technology-related issues in interviews with CINCPACFLT, MIFCPAC, ONI, and NAVCENT. We conducted two types of analyses using interview data.

A qualitative analysis was performed to identify areas of concern (above, sections 3.2) and generate recommendations (see section 4).

A process analysis was performed to define (1) MDA tasks, (2) the entities that execute them, (3) the precedence relationships (or flow) between those tasks, and, when possible, (4) the media used to communicate between tasks, (5) the products of those tasks, (6) the potential application points for Spiral 1 technologies (see section 5). The NPS research team developed a diagram that represented the "as is" workflow. NAVNETWARCOM (through its contractors WBB Inc. and Booz Allen Hamilton) used these data and elaborated on them to create DoDAF OV-6c diagrams of MDA activities. Representatives of more than 20 organizations reviewed and revised the workflow products in two workshops.

We conclude that the "as-is" workflow and related products of this analysis are a sound foundation for a proposed analysis of the future – or "to be" – flow of MDA tasks, one that assumes Spiral 1 technologies are fielded in an organizational environment that includes the newly conceived Maritime Headquarters with Maritime Operations Center (MHQ with MOC).

3.2. Interviews

NPS conducted interviews with a sample of potential users or beneficiaries of Spiral 1 MDA technology. Here, we summarize the process and selected findings of each interview. Specifically, we report comments by interviewees regarding their concerns about Spiral 1 technologies and the environment in which they may be used. (We present recommendations related to the comments in section 5.1. Findings that bear exclusively on the workflow are addressed in a subsequent section). Bear in mind that the comments, below, were gathered from a relatively small number of informants in late 2007 and early 2008. Thus, they may not reflect the true and current state of institutions or their plans.

3.2.1. CINCPACFLT

Representative of the NPS research team met with the CPF N2 MOC Director and overall MDA Lead for N2 during the period 22-28 October 2007 (Kurtz, 2007). The interview

was informal, and focused on the organizational and mission environment for Trident Warrior technologies.

Interviewees raised several issues related to MDA technologies:

- The MOC to be stood up by 31 Jan 2008 will have a traditional organization. It will not include ONA; that function will be executed by N2. The intelligence staff is quite small (CPF N2 currently has 2 Information System specialists and one is an E-9), though there is an effort underway to extend the human resources by combining the CPF Intel Watch with the PACOM JIOC. Given the small size of its intelligence unit, CPF is concerned about the feasibility of learning, using, and maintaining new MDA technologies.
- CPF does not need to maintain awareness of white shipping for its routine operations, though the capability is seen as potentially useful. However, CPF does need this capability to support one, highly complex OPLAN (intentionally unnamed, here). Thus, use of Spiral 1 technologies may be sporadic or localized to very few staff.

Recommendations related to each of these comments are presented in section 5.1 and are indexed back to these interviews.

3.2.2. MIFCPAC

Representative of the NPS research team met with representatives of MIFCPAC 7 January 2008 (MacKinnon & Hutchins, 2008). The interviews were informal. They focused on how MDA is viewed and accomplished by the Coast Guard at MIFCPAC with special attention to current and potential usage of Spiral-1 technologies.

The interviewees raised several issues related to MDA Spiral 1 technologies:

- MIFCPAC is responsible for all vessels approaching the US from continents except Europe. The organization provides considerable support to CINCPACFLT, which has a small staff (see section 3.2.1). However, MIFCPAC is focused on the Coast Guard mission, which concerns both terrorism and regulatory issues such as fisheries and pollution. Thus, its use of Spiral 1 tools may be unusual. For example, MIFCPAC may need alerts that discriminate reliably between loitering in fisheries by (1) American vessels and (2) potentially illegal foreign fishing vessels.
- MIFCPAC sees value in selected MDA technologies. It is already using CMA to support analyses (such as the fisheries analysis, above), and it sees promise in Google and Global Trader. MIFCPAC argues that FASTC2AP may not be "viable" for its uses.

3.2.3. NMIC / ONI

Representatives of the NPS team interviewed several staff of NMIC/ONI 23 October 2007 (Freeman, J., Hutchins, S., 2007). The interviews were structured (see the protocol in section 8.1) to elicit comments about (1) a draft workflow for MDA activities surrounding a tracking and E-MIO scenario, and (2) the utility of MDA Spiral 1 technologies for their activities. NPS interviewed: an information systems manager, a Watch Floor COP manager, and a specialist in boarding operations and data. An informal

interview was conducted with the head of the Advanced Maritime Analysis Cell, and with the lead for a DoDAF architecture effort focused on the intelligence day shops. All interviews were held at the unclassified level.

Data were gathered that extended the MDA workflow model (see section 4). In addition, the interviewees raised several issues related to MDA Spiral 1 technologies:

- ONI continuously monitors 220-350 Vessels of Interest (VOIs). The watch floor – staffed by 13 people – handles as many as six formal Requests for Information (RFIs) daily about these and other vessels, 15-20 informal external requests daily, and a small number of ONI internal queries. The watch forwards approximately one formal RFI to analysis cells (or "day shop", e.g., counter-terrorism, counter-narcotics, counter-proliferation, homeland defense) each day. ONI's capability to handle this, current volume of tasking is hampered by difficulty sharing track data across the Navy, insufficient training resources, insufficient staffing for some activities (e.g., analysis of biometrics findings), and rapid turnover of staff on the watch floor. NMIC/ONI is recruiting several hundred additional staff. However, staff capacity is currently a concern.
- Several Spiral 1 technologies are seen to have particularly high value within ONI or as data feeds to it: CMA, TRIPWIRE, TAANDEM, FASTCAP, and EMIO wireless. However, ONI expressed concern that (a) the interoperability and integration of these and other tools (e.g., with GCCS) was not defined; (b) the process for accrediting new tools for operational use is long (approximately and months) and somewhat uncertain; (c) the tools primarily increase the volume of data available for analysis but do not help analysts to manage those data; (d) the tools do not strongly enhance the capability to rapidly, reliably predict activity given cyclical and emergent events, or infer intent or culpability from scant entity-relationship data; and (e) the provision of tools (e.g., Google Apps for collaboration) is insufficient to provide the intended capability (e.g., improved collaboration) without new processes and training.

Recommendations related to each of these comments are presented in section 5.1 and are indexed back to these interviews. Data from these interviews were used to define parts of the MDA workflow, presented in section 4.

3.2.4. NAVCENT

Representatives of the NPS team interviewed several staff of NAVCENT 11-15 November 2007 (Freeman, J. and MacKinnon, D., 2007). The interviews were structured (see the protocol in section 8.2) to elicit comments about (1) a draft workflow for MDA activities surrounding a tracking and E-MIO scenario, and (2) the utility of MDA Spiral 1 technologies for their activities. NPS interviewed: the ONA Director (N2), the Deputy ONA Director (N2), a Communications Information Systems officer (N6), an Information Management Officer (N6IM), the Deputy Director of Future Plans, ONI's embedded analyst in the ONA, an ONA MIO specialist, and several representatives of the COPS. All interviews were unclassified.

Data were gathered that extended the MDA workflow model (see section 4). In addition, the interviewees raised several issues related to MDA Spiral 1 technologies:

- MDA supports, but is subordinate to the primary missions of NAVCENT: maritime security, anti-terror, and Iran. The prospect of receiving Spiral 1 technologies sparked several concerns: the relevance of the technology effort to primary missions, the shortage of personnel and high rate of turnover (10% monthly), concerns about training staff to use technologies effectively for NAVCENT billets and processes, concerns about system reliability and maintenance, the possibility of reduced manning as a result of MDA automation, and the prospect that the Flag might embark from NAVCENT. These concerns have led NAVCENT leadership to consider whether many MDA activities and Spiral 1 technologies should be housed at a JIOC or at ONI, provided that those institutions can reliably maintain awareness of NAVCENT's mission focus. That said, NAVCENT leadership views positively the Spiral 2 initiative to combine the shore-based radars of many nations with AIS data. This capability would benefit operations in the MOC, and also strengthen partnerships in the region.
- The knowledge of the Spiral 1 technologies among NAVCENT staff (at the time of the interviews) was scant, and so they had limited ability to assess the utility of these technologies. Watchfloor personnel see value in technologies that triggers or alerts concerning specific tracks. They state that they are unlikely to use technologies that require data mining or fusion across multiple sources.

Recommendations related to each of these comments are presented in section 5.1 and are indexed back to these interviews. Data from these interviews were used to define parts of the MDA workflow, presented in section 4.

3.3. Review Workshops

Representatives of more than 20 organizations reviewed and refined the workflow products in two workshops.

3.3.1. Process Engineering Workshop

The Naval Postgraduate School hosted an MDA Process Engineering Workshop (PEW) hosted by 15-17 January 2008. The objectives of the PEW were to:

- Refine, extend, and validate a process model of Maritime Domain Awareness;
- Define attributes of the activities that constitute MDA, specifically information requirements, processing activities, products, and resource (time, manning) requirements (reported in Freeman, Heacox, MacKinnon, 2008);
- Specify which MDA activities may benefit from Spiral 1 technologies
- Develop concepts for assessing the effects of technology; and
- Identify barriers to fielding MDA Spiral 1 technologies

Representatives of the following organizations participated in the PEW: ASN RDA, C3F, COTF, Dept. of the Under Secretary of the Navy, DISA, HFE LLC, JITIC, METRON, MIFCLANT, MIFCPAC, NAVCENT, NAVNETWARCOM, NCIS, NORTHCOM, NPS, NRL, NWDC, ONI, OPNAV, PMW 120, and SPAWAR. Also participating were subject matter experts (SMEs) from several of the MDA Spiral 1 technologies, domain experts ('gray beards'), representatives from the Trident Warrior 2008 (TW08)

operational experiment where many of the MDA Spiral 1 technologies will be assessed, and members of the assessment team (NPS, Aptima, Pacific Sciences & Engineering, WBB Inc.).

3.3.1.1. Workflow review

The PEW participants reviewed several MDA OV-6c workflow diagrams developed by NAVNETWARCOM from NPS workflow data. These diagrams were: "NAVCENT MDA Process" (as well as a summary diagram for this workflow (version 11)), "Provide MDA Info-NMIC", and "RFI Processing-NMIC". The participants recommended revisions to the activities, activity-activity precedence (links), and clustering of activities. The number of revisions was modest, and participants indicated that these workflows are generally correct. PEW participants recommended revisions to the NAVCENT MDA Process workflow to generalize it that it potentially serves MOCs and organizations other than NAVCENT.

3.3.1.2. Technology to Task Mapping

The PEW Participants assessed the utility of Spiral 1 technologies (defined in section 8.3) for each MDA activity (see Table 1). In general, PEW participants asserted that each organizational node that had access to any Spiral 1 technologies would use all of those technologies in most of its activities. Thus, the activities (below) that involve ONI and ONA make heavy use of Spiral 1 technologies because (1) many of the Spiral 1 technologies are designed to support intelligence analysis and (2) many of these technologies will be inserted at ONI and ONA.

Activities conducted by COPS, FOPS, the MOC Director, and BWC are not expected to benefit from many of the technologies, according to PEW participants. One exception is the task “MOC Director: Define CDRs Estimate & COA”, a task in which the MOC director may draw on the Common Intelligence Picture (CIP), Common Operational Picture (COP), and other data sources to develop, critique, and select courses of action.

We note that the assessment of Spiral 1 utility by PEW participants conflicts somewhat with the assessment by the NAVCENT MOC. In particular, NAVCENT anticipates that (1) the BWC would use FASTC2AP and SMS/JPSC2 to execute task “Assess Tactical Asset Availability” and the IWO would use FASTC2APL to execute task “Issue RFI.” In general, NAVCENT and the PEW agreed in their assessment that ONA would use a variety of Spiral 1 technologies in its intelligence analyses. NAVCENT indicated that CMA, MAGNET, FASTC2AP, Google Earth, and SMS/JPSC would be particularly useful to ONA. These differences between NAVCENT and PEW participants are indicated with a * in the table below.

Activities executed by Fleet assets make almost no use of the technologies in the table below, because the Fleet activities do not require most of the analysis functions of these technologies or because Fleet assets are not expected to receive them. E-MIO is a notable exception; Fleet assets will receive E-MIO and will benefit from it, per the table, below.

Note that Table does not include mappings of technology to activities for early-stage, intelligence generation activities (by MARLO, CIFC, NCIS, the COCOM, the International Maritime Bureau, etc.) nor to MOC-to-MOC handoff activities.

Table 1: The utility of Spiral 1 technologies for each MDA activity

Activities	CMA	TAANDEM	MAGNET	FastC2AP	Global Trader	Tripwire	E-MIO Wireless	Google Apps & Chat	Google Earth	SMS/ JPSC2	LInX	Austr AIS
40: ONI: Intel	X	X	X	Tbd	X	X		Tbd	Tbd	X		Tbd
55: ONA: Nominate potential VOI	X	*X	X	X					*	*		
60: ONA: Validate/(Re)Prioritize VOI	X		X	*		*X		*X	X	*		
70: MOC Director: Receive/Decide/Route VOI									X			
80: COPS: Process VOI												
90: FOPS: Process VOI												
100: BWC: Assess Tactical Asset Availability				*						*		
110: MOC Director: Define CDRs Estimate & COA	X	X		X		X		X	X		X	
112: CNO/NOO: Approve COA	X							X	X			
115: MOC: Coordinate MOC-to-MOC Handoff	X							X	X			
120: IWO: Issue RFI				*								
125: ONI issues RFI to MOC	X	X	X	X	X	X		X	X		X	X
130: ONA: Process RFI (Issue, Fulfill, Assess Fulfilled)	X	*X	X	X	*X	*X		*X	X	*	*X	*X
140: ONI: Process RFI (Issue, Fulfill, Assess Fulfilled)	X	X	X	X	X	X		X	X	X	X	X
150: NCIS, CIFC, MARLO, MIFCPAC, NGA: Process RFI								X	X	X	X	
160: BWC: Communicate Mission Orders												
170: 6391: Fleet Asset: Plan & Direct VBSS Mission												
175: tbd#175: Fleet Asset: ISR Data Collection												
180: Fleet Asset: Take Biometrics/Boarding Data							X					
200: BFC: Analyze Biometrics												

Activities	CMA	TAANDEM	MAGNET	FastC2AP	Global Trader	Tripwire	E-MIO Wireless	Google Apps & Chat	Google Earth	SMS/ JPSC2	LInX	Austr AIS
205: ONI: Analyze biometric findings					X	X					X	
207: NGIC/ONI: Store biometric report												
210: ONI: Analyze Boarding Data	X	X	X	X	X	X					X	
220: Fleet Asset: Receive Boarding Data Analysis							X					
230: ONA: Analyze Findings	X	*X	X	X	*X	*X		*X	X	*	*X	*X
240: Coalition: Execute VBSS Mission												
250: COPS: Monitor VBSS												
260: COPS: Recommend Change Mission/Revision of CAT Level												
270: COPS: Recommend Mission Complete												
280: ONA: Monitor Vessel of Interest on Watch List	X	*X	X	X	*X	*X		*X	X	X	*X	*X

Note: An "X" in this table indicates that the activity would benefit from the Spiral 1 technology in the opinion of PEW participants. A "*" indicates that the assessment by NAVCENT MOC is opposite a PEW assessment.

3.3.1.3. Assessing the effect of Spiral 1 technologies

PEW participants offered ideas for assessing the effects of Spiral 1 technologies on tasks, though there were few specific measures suggested and no performance standards. These Strategies for assessing the fit of technologies to tasks fell into three categories, which should be a focus of future experiments and evaluations:

- Affects on access to information (that was previously inaccessible by the performing entity);
- Affects on speed of decision making; and
- Affects accuracy of decision making.

The effects of technology on decision making are not always positive, of course. For example, CMA data access might increase the speed of decision making involving highly focused searches for information, and it might slow decision making when less focused research must be conducted across a very large number of databases. Decisions might become more accurate in either case, or less accurate if sources conflict.

3.3.1.4. Issues raised

Participants raised a number of concerns about the process of fielding Spiral 1 MDA technologies. Many of these concerns are typical for a technology insertion program, and thus they represent challenges of program management and customer expectation management.

- Customization of MOCs
    - Organizational structures and missions (that compete with MDA) vary between COCOMS and MOCs. MDA TTPs need to be sufficiently flexible to accommodate these differences. Alternatively, a variety of TTPs (e.g., for small vs. large TOCs) may be needed.
- Manning
    - Current Navy guidance does not require a reduction in manning resulting from implementation of Spiral 1 technologies. NAVCENT and PACFLT have stated that they will require additional staff to operate and maintain the technologies.
- Technology capability
    - Some Spiral 1 technologies are prototypes. In at least one case, the technology SME warns that these technologies may not be sufficiently robust for use by operational forces (e.g., false alarm rates may be too high), and that their proper place for now is at reachback institutions (such as NMIC/ONI) that have the backup capacity to overcome these potential failures. Other stakeholders have expressed concern about specific technologies: CMA (number of databases delivered vs. number of databases promised), TAANDEM (accreditation challenges), FASTC2AP (maturity of the alerting capability).
- Training
    - NAVCENT and PACFLT have expressed concern that training products be delivered with the systems, and that this training address their specific applications of the technology..
- Technology Installation
    - Standardization: The unique IS environments across the fleet will present a challenge technology installers.
    - Physical capacity: Some sites do not have the physical space to accommodate additional technologies, particularly if each technology is delivered on a separate server. NORTHCOM is a case in point. It can expand its IS spaces for new servers only by blasting additional rooms into the mountain.
    - Power capacity: The old infrastructure at some sites constrains insertion. ONI, for examples, requires additional electrical power for every

significant technology insertion. Delivery of additional power can take half a year or more.

- Testing
    - Metrics are needed to assess effects of technology insertion relative to current state. Unfortunately, there are few if any published standards that define the effectiveness of current solutions in operations. (Standards for the Navy Task List pertain to training, not operational use, for example).
    - A sufficiently detailed scenario is needed to drive testing. This scenario must systematically address the variety of MDA data types (vessel, people, cargo, etc.), reporting products, node interactions, and time course of activity in a problem that involves discovery, analysis, and prosecution of VOIs. Particularly important challenges in MDA are: ISR management, collection planning, decisions regarding opposed and unopposed boardings, tracking neutrals. In addition, scenario designers should consider events in which multiple vessels collaborate in a threat incident, either through cargo transfer between vessels or by synchronized tactical actions of two or more vessels. TW08 is developing a scenario using systematic methods.
- Process Analysis
    - Additional detail is needed concerning intelligence analysis processes (monitor, collect, fuse, analyze, and disseminate). This analysis is being conducted independently by ONI, but that process has only recently begun (e.g., analysis of one day shop was completed as of November 2007) and so the results may not be available to support Spiral 1 testing.
    - The MDA workflow should be aligned with the MHQ w/MOC process architecture. This was successfully addressed in a Process Alignment Workshop 29 January 2008.

3.3.2. Process Alignment Workshop

The MHQ w/MOC team for process architecture at Second Fleet hosted a Process Alignment Workshop (PAW) on 29 January in Norfolk, VA. The objectives of the PAW were to:

- Review the MDA workflow and recommended limited revisions;
- Map activities in the MDA workflow to MHQ w/MOC processes or activities, and identify any issues in doing so.

The participants in the workshop were approximately 20 warfighting functional area leads, system and process architects, process SMEs, and interoperability experts. Tim Sorber of Klett Consulting and the Second Fleet MHQ w/MOC architecture team organized the session and co-led the workshop with Dr. Jared Freeman (Aptima) for the NPS team, and Greg Allen of WBB.

3.3.2.1. Workflow review

The PAW participants recommended several revisions to the MDA workflow. These were communicated to the DoDAF architecture lead, WBB. Revision of the DoDAF OV-6c is currently awaiting funding decisions.

3.3.2.2. Mapping of MDA-to-MHQ w/MOC

Virtually all MDA activities from the DoDAF "Overview" diagram mapped to one or more MHQ w/MOC core processes with the following exceptions, each of which is currently being addressed:

- The MDA workflow represents a handoff between MOCs. There is no corresponding MHQ w/MOC process or activity.
- The MDA workflow specifies that COPs plans responses to VOIs. The MHQ w/MOC processes specify that FOPs plans, and that COPs does not.
- The role of the MOC Director in the MDA workflow may conflict with definitions in the MHQ w/MOC architecture.
- The role of the Foreign Disclosure Officer is not yet represented in the MDA or MHQ w/MOC processes.
- COCOMs each accomplish the MDA mission uniquely. These MDA roles therefore need further development and refinement.
- The role of the IWO in handling RFIs may need to be clarified in the MDA workflow.
- Some MDA activities map to more than one MHQ w/MOC process. This may reflect ambiguity in the MDA workflow. It may be an inherent challenge of mapping tactical MDA activities to operational processes of MHQ w/MOC.

Some of these discrepancies may exist because the MDA workflow represents “as is” processes (primarily by NAVCENT, in the case of planning), while MHQ w/MOC processes and activities are “to be.” Some discrepancies may be due to conflicts in wording. For example, MDA COPs planning may in fact by more an adaptation of extant plans (created by FOPs) than the generation of plans within COPs.

4. As-Is MDA Workflow

Using the process described above, the NPS team documented the workflow of Maritime Domain Awareness for a select set of organizations:

- Afloat Units
- Biometrics Fusion Center (BFC)
- Boarding Party
- CIFC
- CINCPACFLT
- COCOM
- MARLO
- MIFCLANT
- MIFCPAC
- NAVCENT MOC
- NCIS
- NMIC
- Subordinate Commanders & Staff

Figure 2: MDA Workflow

These organizations were chosen in part because the scenario used in interviews involved a suspect vessel en route from the Middle East towards the West Coast of the U.S. Other scenarios might, in the future, engage other organizations and invoke other activities.

The workflow represents the activities of the NAVCENT MOC (109 activities) and NMIC (50 activities) in the greatest detail. The remaining organizations are represented by a dozen tasks or fewer.

The flow is quite dense and complex. Figure 2 presents it in full. Because this representation and the DoDAF graphs are difficult to reproduce at a legible scale, we have decomposed the graph by organization, cell, or role to make it legible (see section 8.4).

Our analysis here concerns the structure of these graphs, and the concerns about the potential impact of new information technologies on these workflows.

4.1. Structural Issues

The structure of the MDA workflow is, itself, revealing. Here, we make several comments based on our experience modeling and empirically testing organizational structures and processes (c.f., Levchuk, G., et al., 2003, 2005). The reader may want to examine the diagrams in 8.4 while reading this section.

Most of the entities engaged in MDA have multiple dependencies on activities conducted externally. These dependencies represent a trade off between the benefits of accelerated and accurate task execution by specialized external assets, and the risk of loss of control by the organization dependent on them. The activities at greatest risk are those within an organization that rely fully or partly on input from external entities. Thus, special attention should be given to the impact of Spiral 1 technologies on these processes.

NMIC intelligence operations appear to be highly serialized (Figure 3). MOC activities are somewhat more parallel. Parallelism offers greater resilience (i.e., more alternatives for accomplishing missions) at higher coordination costs. Seriality offers the benefits of low coordination costs at the risk of failure due to a break in the chain. Thus, special attention should be given to the impact of Spiral 1 technologies on coordination of processes in the MOC (or wherever parallel processes dominate) and failure detection in NMIC (or wherever serial processes are prominent).

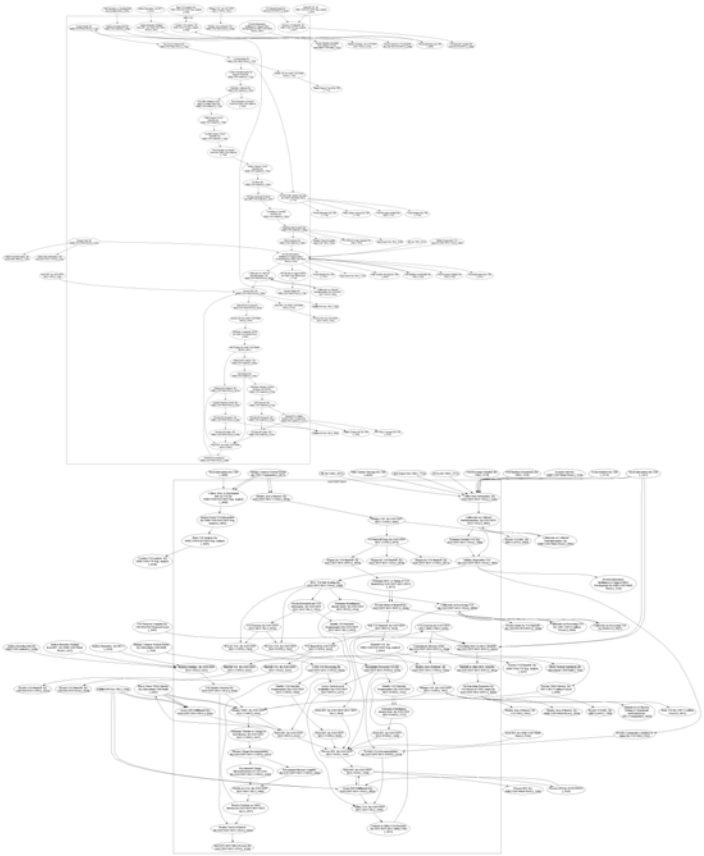

Figure 3: MDA workflow is serialized in NMIC/ONI (left) relative to NAVCENT MOC (right).

4.2. Technology-Related Issues

Spiral 1 Technologies will primarily benefit the intelligence functions in MDA, activities conducted by NMIC/ONI and by the MOC ONA, according to informants in this study. These intelligence functions trigger MDA activity within the MOC, and they respond to RFIs from the MOC (and other entities). Technology that primarily benefits the intelligence function may produce two risks, which must be monitored and managed.

First, Spiral 1 Technologies may enable the intelligence function to be more productive, rapid, and accurate. Thus, the rate of intelligence flow into the MOC may accelerate beyond the MOC's ability to process this material. This is a significant concern if the increase in traffic raises the number of independent vessels that must be address (more than it increases the depth of information available about a small number of suspect vessels).

Second, as the intelligence operations become more sensitive to and responsive to rapid information flow, analysts may experience new *primacy* effects. Primacy is a tendency to weight initial evidence more heavily than subsequent evidence (Tversky & Kahneman, 1974). It is a well-documented psychological phenomenon, and it arguably produces greater biases in decision making when the time course of information varies highly (e.g., some information arrives every minute, some daily) than when there is little variance in information rate (e.g., all information arrives in a daily briefing or working session). Customers of the intelligence functions (e.g., the MOC) may also be subject to new primacy effects as the rate of information delivery from the intelligence function changes. Thus, there may be subtle and potentially undesirable effects of new information flow rates on intelligence analysis, and this should be raised as a concern to analysts or their management.

Recommendations concerning these issues are presented below.

5. Recommendations

In this section, we make recommendations for action by MDA program leadership, based on the qualitative analysis and the workflow analysis, above. We have indexed each recommendation to the report section, above, to which it responds.

5.1. Recommendations from Qualitative Analysis

(1) Pay particular attention to planning and socializing the plan to train and maintain support Spiral 1 technologies. This may allay concerns in CINPACFLT, NAVCENT, and elsewhere that the technology delivery is not paying sufficient attention to the human factor. (See section 3.2.1 CINC).

(2) Training for Spiral 1 technology users and maintainers should be rapid, demonstrably effective, and customized to local missions and procedures. This will address concerns that technology won't support local missions and processes for staffs with high turnover (See sections 3.2.3 NMIC / ONI, 3.2.4 NAVCENT, 3.2.1 CINC, and 3.3.1 Process Engineering Workshop).

(3) Given the potential that staff will use new MDA technologies infrequently in some organizations, they may forget how to use the technologies efficiently and well. Usability, training, and technical support will be particularly important predictors of success in these organizations. These should be a focus of assessment (See Section 3.2.1 CINC).

(4) Technology providers should continue to brief user communities concerning the maturity and delivery schedules for technologies. This may help users to prepare for the specific capability they will receive (See Section 3.3.1 Process Engineering Workshop).

(5) The accreditation process must be carefully managed across the Spiral 1 technologies. Lessons learned should be used to accelerate that process (See Section 3.2.3 NMIC / ONI).

(6) Interoperability issues should be assessed and managed carefully. Interoperability reduces training requirements, facilities requirements, and cognitive load (imposed when users must remember results from one system

while they use another, or fuse information mentally). (See section 3.2.3 NMIC / ONI).

(7) Technology roll-outs to NAVCENT should be (1) selective, to respect NAVCENT's vision of its role and capabilities, and (2) strongly supported with training and technical aid to ensure that NAVCENT evaluates those technologies in the most positive light. (See section 3.2.4 NAVCENT).

(8) In deliveries to NAVCENT, emphasis should be place on technologies that support alerting over technologies that support data mining and fusion, for which NAVCENT is not currently well staffed (See section 3.2.4 NAVCENT).

(9) Technology roll-outs to MIFCPAC should be (1) selective to support the organization's missions, and (2) include support to customize the technology for regulatory enforcement missions (See section 3.2.2 MIFCPAC).

(10) Technologies with low accuracy or reliability should be placed in reachback centers rather than front line operational centers (See Section 3.3.1 Process Engineering Workshop).

(11) Spiral 1 fielding will require attention to marked differences between installation environments with respect to physical space, power capacity, etc. (See Section 3.3.1 Process Engineering Workshop).

(12) Technology assessments should focus largely on the effects of Spiral 1 insertion on (1) access to information that was previously inaccessible or difficult to access, (2) speed of decision making, and (3) accuracy of decision making. Measures on these activities will be of great interest to user communities (See Section 3.3.1 Process Engineering Workshop).

(13) MDA assessment should accurately measure the impact of new technologies on training and maintenance requirements for Spiral 1 technologies relative to current requirements. This will help user communities predict and manage these costs (See Section 3.3.1 Process Engineering Workshop).

(14) MDA "to be" process must be standardized to ensure the interoperability of MDA stakeholders, but customized to local missions and capabilities. This is a significant challenge. It is one faced by the MHQ w/MOC process architecture team, and their strategies should be studied and applied here (See Section 3.3.1 Process Engineering Workshop).

(15) A "to be" workflow for MDA at ONI using Spiral 1 technologies should be developed in collaboration with the team that is conducting DoDAF modeling of ONI analysis processes.

5.2. Recommendations from Workflow Analysis

From the analysis of the workflow we make the following recommendations.

(16) Calibrate the rate of information flow from intelligence entities to the MOC to ensure that the MOC is able to accurately filter and process incoming intelligence.

(17) Institute sound policies for assessing the priority of intelligence incoming to the MOC and intelligence passed between ONA and other units of the MOC.

(18) Modulate the rate of information flow to the MOC to deliver coherent, balanced packages of intelligence, where this is appropriate, rather than partial feeds of information.

(19) Carefully review critical decisions that use information whose update rate varies highly with an eye towards testing and revising conclusions that are supported mainly by evidence received early.

(20) Focus process management activities on those activities that rely on input from outside an organization, particularly in the MOC, which may experience changes in the rate of workflow as it restructured (by MHQ w/MOC) and re-equipped (with Spiral 1 Technologies).

(21) Focus process management activities in ONI on properly allocating tasks (e.g., to the appropriate analysts) and monitoring the state of tasks in the relatively serial process chain.

6. Recommendations for Future Research

NPS defined the workflow for Maritime Domain Awareness as it is currently executed by several Navy organizations, vetted that workflow in two workshops and coordinated it with the MHQ w/MOC process architecture method, and mapped the Spiral 1 Technologies to a representative sample of MDA activities. We developed recommendations for assessing and fielding these technologies, with a particular focus on human factors: mission-specific technology selection, training, assessment, process design and management, and communication with user groups.

A key product of this work was a matrix (see Table 1) that defines the utility of each MDA technology for key MDA tasks, identified from the workflow. The principle objective of future NPS efforts is to refine this matrix by specifying:

- The attributes or features of each technology that have high utility in each MDA task
- The DOTMLPF required to complement MDA technologies

This activity will specify the best targets (i.e., tasks) for MDA technologies, requirements (or opportunities) for new or upgraded MDA technologies, and a well-defined DOTMLPF to complement the technological solutions.

NPS recommends that the Navy sponsor the effort, above, in the following ways:

- Conduct technology assessments that focus on human factors issues: trainability, usability, utility, and the fit between technology, organizational structure, and processes.
- Extend the current as-is analysis to define MDA to-be procedures that (1) conform to the MHQ w/MOC and ONI process architectures and (2) are customized to the needs of specific users.

- Develop instruments and techniques for monitoring, measuring, and managing workflow at critical junctures in the MDA process.
- Implement a program to define a rapid, tailorable technology training program and measure its effectiveness. Adapt both the training and technology accordingly.

NPS will proceed with its planned assessment activities under the current contract. This includes collecting and refining objectives; as well as defining each objective's goals, guiding questions, system requirements, measures to be recorded, and data collection plan. This will be placed for each objective into a retrievable data base entitled FIRE (FORCEnet Innovation Research Enterprise).

We look forward to feedback from readers of this status report.

7. References

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8. Appendices

8.1. Interview Protocol: ONI

8.1.1. 10min: Briefing

* Introductions
    * Introduce ourselves personally
    * We are working for PEO C4I to document the current Maritime Domain Awareness process and help to define a new process that capitalizes on some powerful technologies.
* The task:
    * We would like your help defining the current process for Maritime Domain Awareness.
    * We'll do this by editing a draft diagram of the MDA process and addressing some questions.
    * We built this diagram after interviewing: C3F, C7F, NAVCENT, & ONI
    * It is undoubtedly incomplete an incorrect in some ways. We need your help to refine it.
    * The document we produce here will be tested in a process engineering workshop early in 2008, and that will inform experiments and fielding of an initial operating capability.
    * We'll begin by reviewing the overall MDA process in the context of a tracking scenario and a boarding scenario.
    * Then we'll discuss some details concerning your MDA procedures.
* Ground rules:
    * We have _ hours. We need to work quickly and at a fairly high level.

8.1.2. 30min: Refine workflow overall

* Consider this tracking scenario: Tracking and hand off of a vessel of interest that is transiting between two Maritime Headquarters' AOR
* Present workflow graph. Focus the respondent(s) on their swim lane.
* Examine the procedures that involve your organization: How is this process incorrect? What's missing?
* Consider this EMIO scenario: EMIO to include the collection and dissemination of boarding data to the varied analysis nodes and the dissemination of the resulting analyzed/fused products
* Examine the procedures that involve your organization: How is this process incorrect? What's missing?

8.1.3. 75min: Refine nodes

* What are the most critical procedures that you execute
* Present the amended workflow graph. Focus the respondent(s) on their swim lane.
* Starting with each critical procedure, then returning to the rest, ask

* Input: What documents, information systems, or discussions do you need to begin this process? What information, very roughly, do these give you?
* Output: What documents, information systems, or discussions does this process produce?
* Process: What happens inside this process to generate that output from the input?
* Throughput/Timing: How many times do you typically execute this task in a given hour or day? Alternatively, how long does it take to do this task once (for a given VOI, etc.)?
* Resources? What resources -- people. assets, other information systems -- do you need to execute this process? How much of that resource is available for MDA on a given day?
* Pitfalls: What makes this procedure difficult, slow, inaccurate, or likely to fail (e.g., technology, classification levels, workload)?
* [Other critical questions from the DoDAF team at BAH]

8.1.4. 5min: Debrief

* That covers the questions we have.
* Do you have any questions or concerns that we should here? E.g., content, use, future coordination
* If you'd like to call us at any point, here's how you can do so. [Provide business cards.]
* If you'd like to speak to the lead for this effort, he is Dr. Shelley Gallup, NPS, spgallup@nps.edu, 831 656 1040.

8.2. Interview Protocol: NAVCENT

NPS MDA Team Objectives

* Define sub-activities for the DoDAF architecture
* Draft a sub-activity x technology feature matrix
* Develop a brief summary of findings for 11/29 program review

8.2.1. 10min: Briefing

* Introductions
    * Introduce ourselves
    * We are working for OPNAV N3/N5 and the MDA Barrier Working Group
* Our mission
    * Document the current MDA process so that we can measure the operational impact of new, Spiral 1 MDA technologies.
    * Define and asses future MDA processes and technologies
* Today we will
    * Refine a description of your process for Maritime Domain Awareness
    * Select technologies to improve your processes
* Our process

* We'll do this by editing a draft diagram of the MDA process and addressing some questions.
* We built this diagram after interviewing: C3F, C7F, NAVCENT, & ONI
* It is undoubtedly incomplete an incorrect in some ways. We need your help to refine it.
* The document we produce here will be tested in a process engineering workshop early in 2008, and that will inform experiments and fielding of an initial operating capability.
* We'll begin by reviewing the overall MDA process in the context of a tracking scenario and a boarding scenario.
* Then we'll discuss some details concerning your MDA procedures.

* Ground rules:
    * We have __ hours. We need to work quickly and at a fairly high level.

8.2.2. 30min: Refine workflow overall

* Present workflow graph. Focus the respondent(s) on their swim lane and ask them to consider this scenario: *MDA Vessel of Interest originates in the NAVCENT AOR with a tipper/alert. It proceeds across C5F, C7F, C3F AORs. This requires tracking and MOC-to-MOC handoffs. It culminates in an EMIO boarding in the vicinity of Hawaii or West Coast of CONUS.*

1. How is this process incorrect? What's missing? (Note: Make this a quick pass).

8.2.3. 45min: Refine nodes

* Starting with each task, ask (Note: Scale or prioritize this task if necessary by focusing first on "critical" tasks.)

2. **Process:** What happens inside this task?
3. **Input:** What documents, online-data, or discussions do you need to begin this process? What information, very roughly, do these give you?
4. **Output:** What documents, information systems, or discussions does this process produce?
5. **Trigger:** What triggers this task: a schedule and/or an event?
6. **Metrics:** How do you measure success of this task? What is the criterion for success?
7. **Pitfalls:** What may make this task difficult, slow, inaccurate, or likely to fail (e.g., technology, classification levels, workload)?
8. **Periodicity:** Is this task performed continuously or on-demand?
9. **Periodicity:** How often do you execute this task (__ times per ___hr/day/wk/mo/yr)? Please state a range from low to high frequency?
10. **Duration:** How long does it take to execute this task (e.g., for a given VOI)?
11. **Flow/Precedence:** Does this task happen in parallel with other tasks? Which tasks?

* Note: Address the "Additional questions", below, if time permits

8.2.4. 45min: Assign technologies

12. What technology do you use now for each task?

13. What technology features do you use or want to perform this task? (Note: We will later map these features back to the given MDA technologies to identify feature fits and feature gaps)
14. Which of the planned technologies would you apply to each task?
15. Why? What features make the new technology valuable in that task?

8.2.5. 5min: Debrief

* That covers the questions we have.
* Do you have any questions or concerns that we should here? E.g., content, use, future coordination
* If you'd like to call us at any point, here's how you can do so. [Provide business cards.]
* If you'd like to speak to the lead for this effort, he is Dr. Shelley Gallup, NPS, spgallup@nps.edu, 831 656 1040. Alternatively, contact Dr. Douglas MacKinnon, djmackin@nps.edu, 831-656-1005.

8.3. Spiral 1 MDA Technologies

Technology SMEs described the Spiral 1 products to PEW participants. These descriptions are summarized here.

8.3.1. CMA

Vessel tracking and history from 350 databases. Features include search agents, confidence reporting, Level 1 multi-int fusion, remote access.
Caveats: Utility depends on how and when data are processed by the data source. Note also that source data may be needed in some domains, but CMA does not provide it on the General Service (GENSER) side, though it does on the FBI law enforcement side. Recent areas of technology improvement are: queries, defining areas of interest, subscriptions.

8.3.2. TAANDEM

Anomaly detection that delivers alerts through the CMA or GCCS user interface, with drill down to evidence. Note that an anomaly is defined as a violation of prototypical behavior of a specific class of the track within the context of geography and time of year or sea conditions; e.g., too fast, off a Great Circle route, deviations not accounted for by sea state, rendezvous by vessels when neither is a tanker, stopping to reroute. May also be used to predict VOI location in order to task a VBSS team or ISR asset.
Caveats: TAANDEM currently generates a large number of false alarms.

8.3.3. MAGNET

A Coast Guard enterprise system that allows data concerning vessels, cargo, and people from multiple participating databases to be accessed and flow across identified networks. Information can then be retrieved using operator-defined agents for routine search (e.g., weather in region X), anomaly detection (e.g., any vessel passing within a defined region, mismatches of ship info), and alerting of a user-defined list of recipients (e.g., any Captain of a Port)

8.3.4. FastC2AP

Anomaly detection from SEAWIRE, AIS, and other data via user-configurable scraping agents. Provides ship imagery and monitoring of chat. Publishes alerts to anyone in the enterprise. May also be used to predict VOI location in order to task a VBSS team or ISR asset.
Caveats: Intended to be used on-demand, not for monitoring (as is the case in TAANDEM).

8.3.5. Global Trader

Supports queries about cargo data and several types of automated analyses: anomaly detection (statistical and machine learning), pattern matching, and clustering. Provides alerts with supporting evidence. Operates over 1.5 million transactions in a growing database.

8.3.6. Tripwire

Mines unstructured text data and alerts analysts to messages of interest, based on user-defined, persistent alerting rules. Provides access to historical data (not available in CMA).

8.3.7. PAELOMON

Mines unstructured data to generate link analyses, such as networks that relate a suspect person to other people, vessels, ports of call, etc. It mines classified messages and open source data, including text and imagery.
Note: PAELOMON's application to MDA activities was not addressed at the PEW because this was not a known MDA Spiral 1 technology in advance of the PEW.

8.3.8. E-MIO Wireless

Satellite transmission/reception for non-biometric unclassified boarding data (manifests, etc.). Automatically ingests data into authoritative databases. To be issued to coalition partners.

8.3.9. Google Apps & Chat

Alerts, chat, blogs, calendar, tabbed web portal, and productivity tools. Data are stored in a secure Navy enterprise maintained by Google. Supports data sharing between the Navy, Dept. of State, Dept. of Justice, etc.
Caveats: The Navy has purchased 5000 licenses for Spiral 1. Intended for humanitarian assistance and disaster relief.

8.3.10. Google Earth

Provides global mapping via NIPR, CENTRIX and/or SIPRNET. Google Fusion fuses data for display via a streaming server.
Caveats: Spiral 1 will provide users with a programmer's interface and instructions, but no applications.

8.3.11. SMS/JPSC2

Port & coastal surveillance in an unclassified COP via radar feeds from Homeland Security and other sources.

8.3.12. LInX

Provides access to law enforcement data. Data included are: arrest, traffic, bookings, warrants, pawns, field interviews, investigations
Caveats: Data are organized into separate databases by US region. Sharing agreements are bilateral, thus any sharing outside each bilateral agreement must be negotiated. Access is only to NCIS and law enforcement, and it is read-only.

8.3.13. Australian AIS

Australian AIS data feed indicates location of ships operating within the Australian operating area.

8.4. MDA Workflow

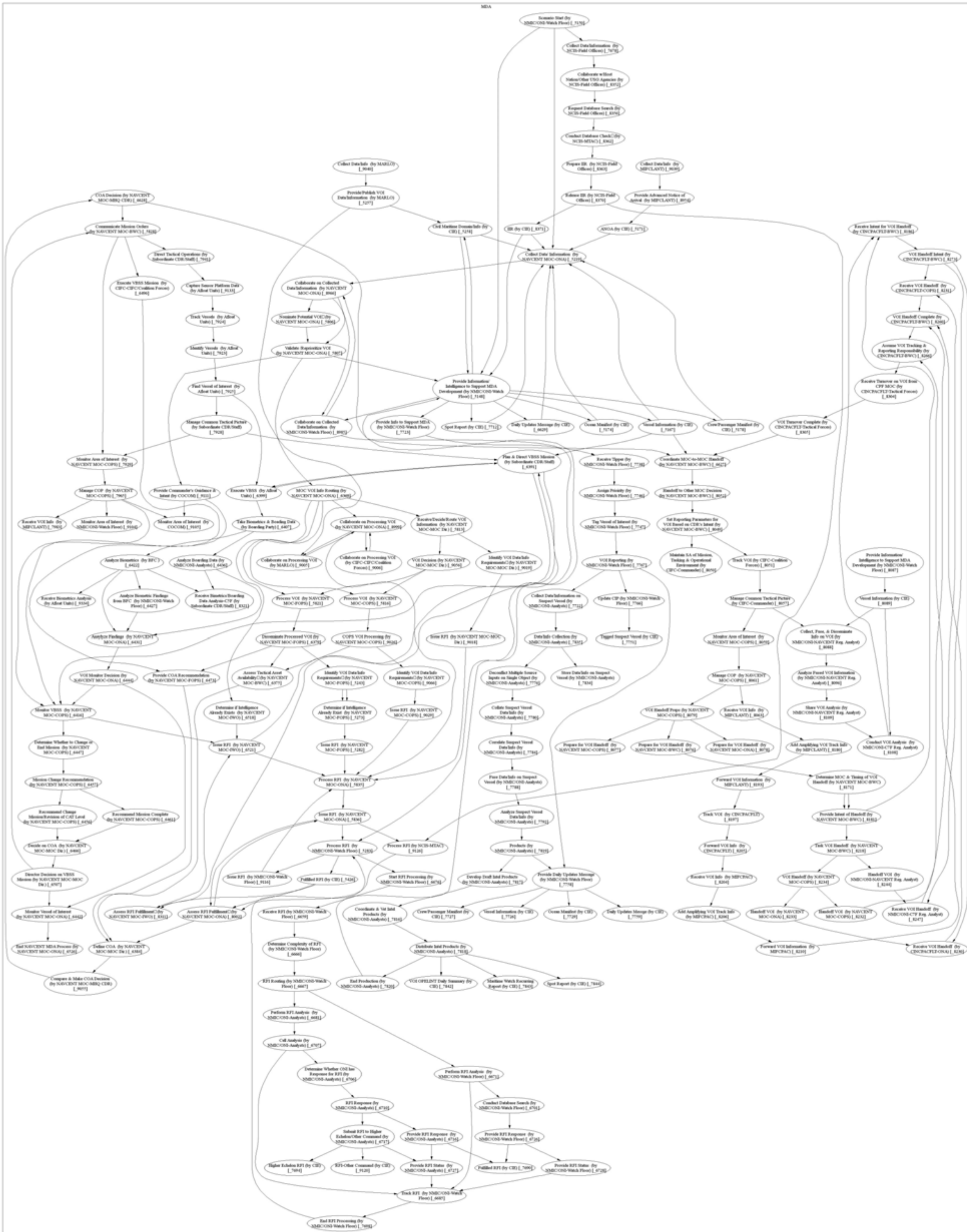
The workflow documents presented below define workflow within an organization or, when that organization has many activities, within a cell or role. The workflow incorporates data developed by NPS in interviews and workshops, as well as inferences made by NAVNETWARCOM contractor WBB (and verified in the workshops above). These data are represented in the MDA OV-6C data developed by NAVNETWARCOM. The graphs, below, were generated from a current version of that data set delivered by Booz Allen Hamilton to Aptima on 29 February 2008.

The following conventions are used here:

- The activities of a specific organization, cell, or role are framed in a rectangle. Their interactions with other entities are indicated by arcs to nodes outside that rectangle.
- Each activity node specifies:
    - The activity (e.g., Prepare IIR) or information product in the Collaborative Information Environment (CIE)
    - The entity who performs the activity (e.g., NCIS)
    - In some cases, the corresponding MHQ w/MOC Core Process. (The mapping of MDA tasks to Core Processes was conducted for high level tasks only. Tasks that are not marked with Core Processes here are subordinate to other tasks that are so marked.
    - The node identifiers from DoDAF data.
- Where multiple arcs emerge from a node, these sometimes represent options (“or”, not “and”).

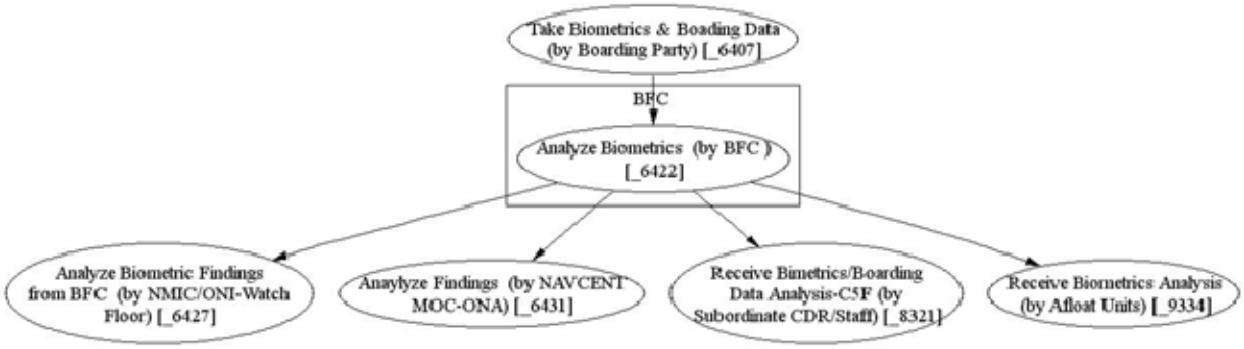
The reader can view these detailed images by expanding them (select and drag the corners) and zooming the view. These images are jpeg files that should port well to other applications for better viewing. The data, scripts, and application used to generate these graphs are available upon request.

8.4.1. MDA

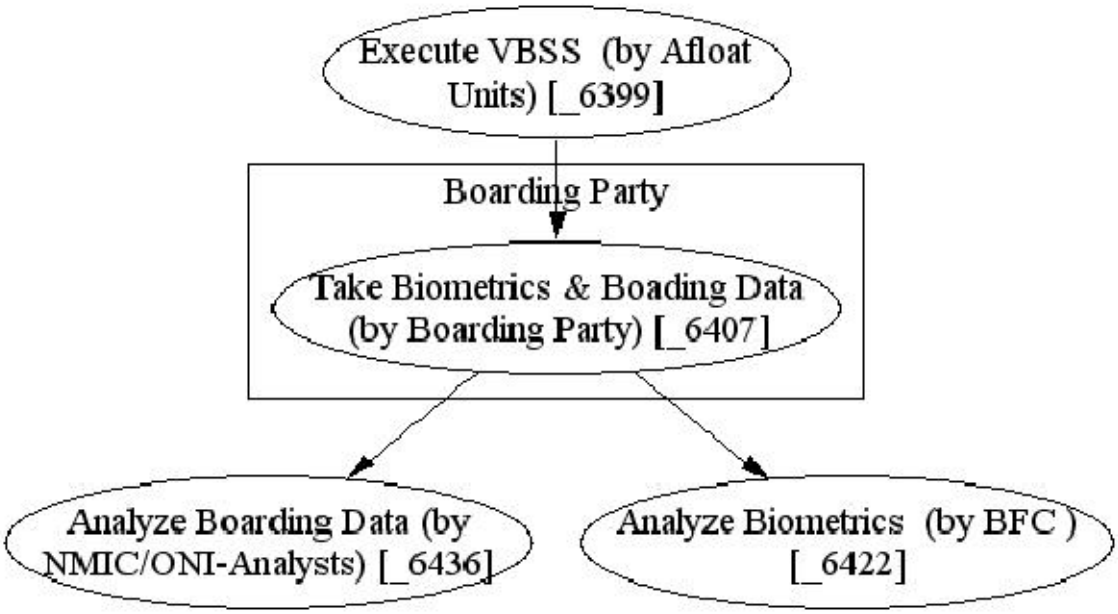


8.4.2. Afloat Units

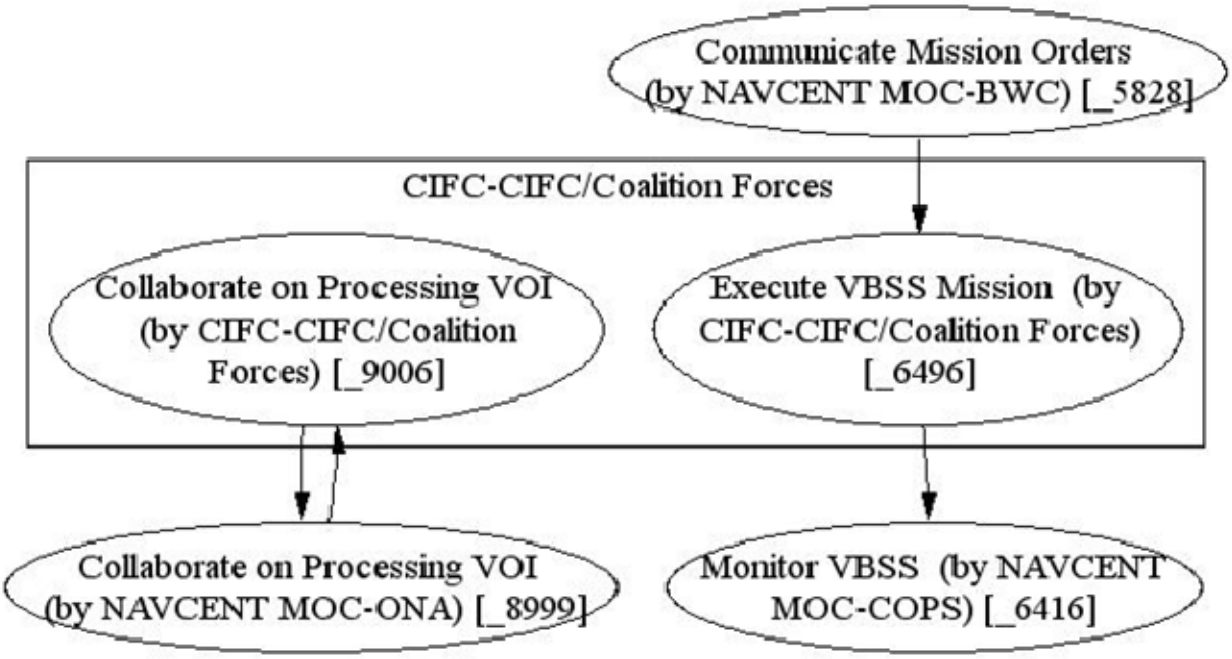
8.4.3. Biometrics Fusion Center



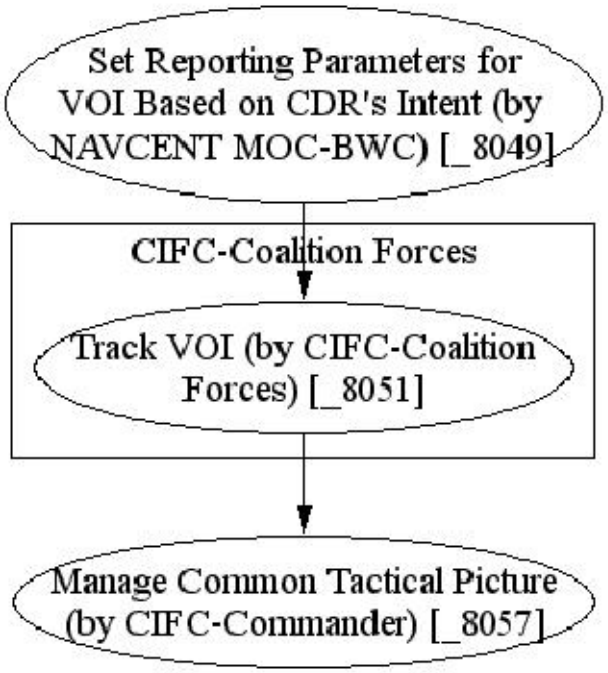
8.4.4. Boarding Party



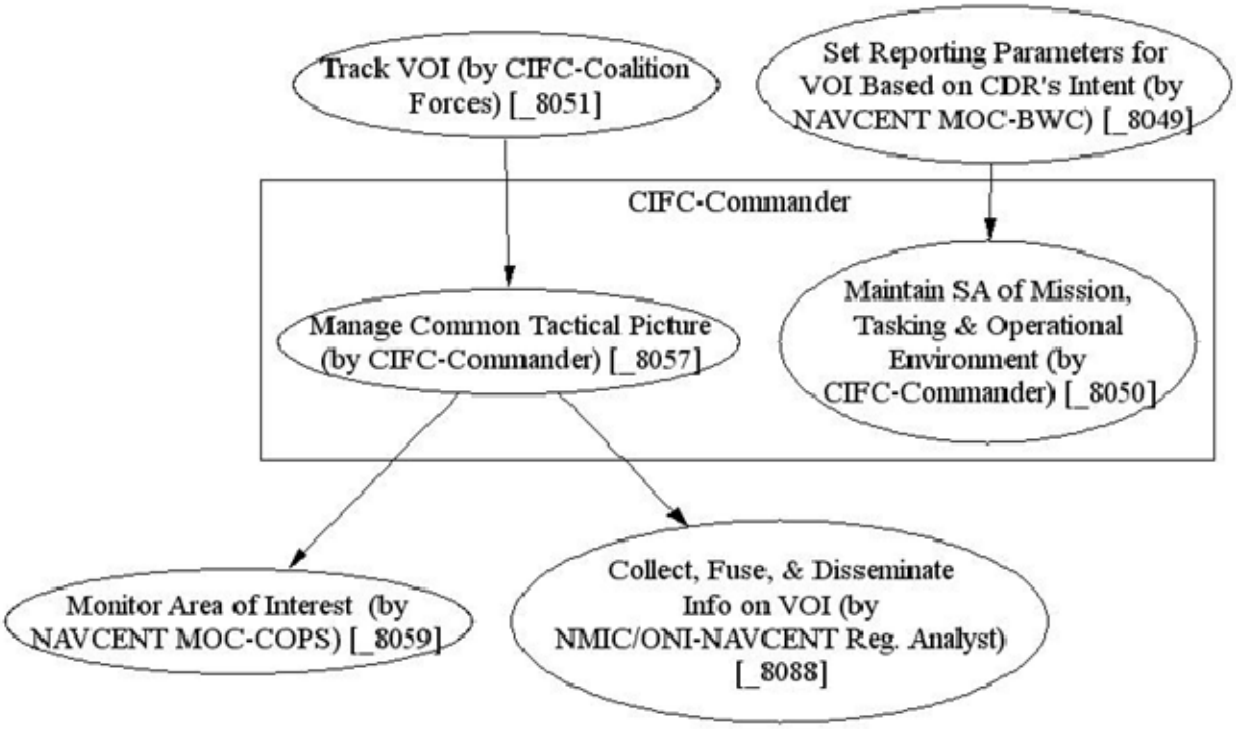
8.4.5. CIFC: CIFCCoalition Forces



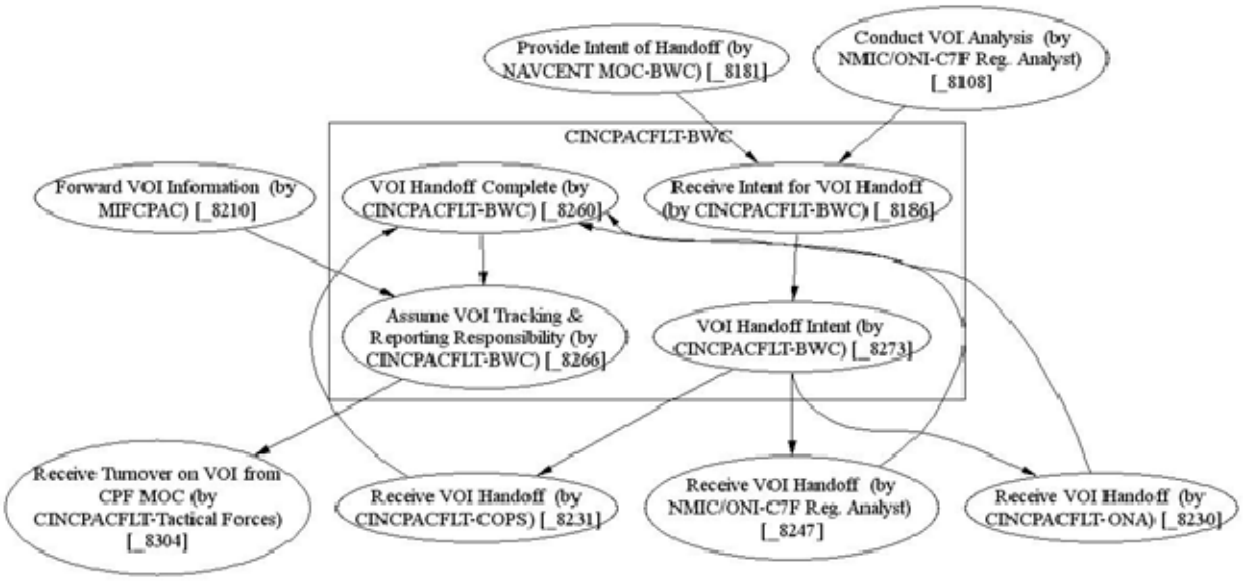
8.4.6. CIFC: Coalition Forces



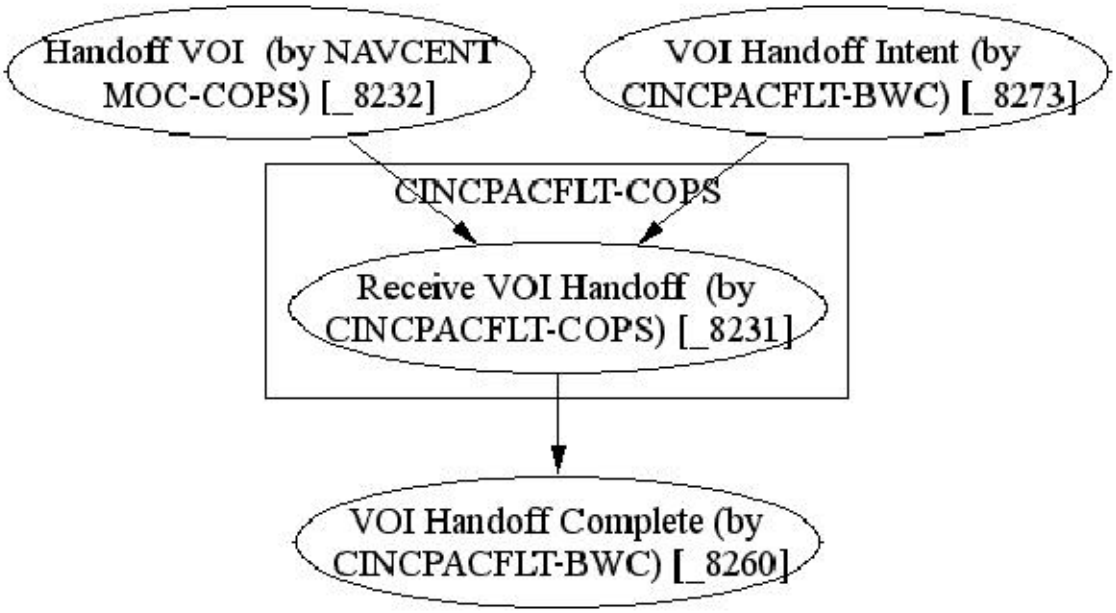
8.4.7. CIFC: Commander



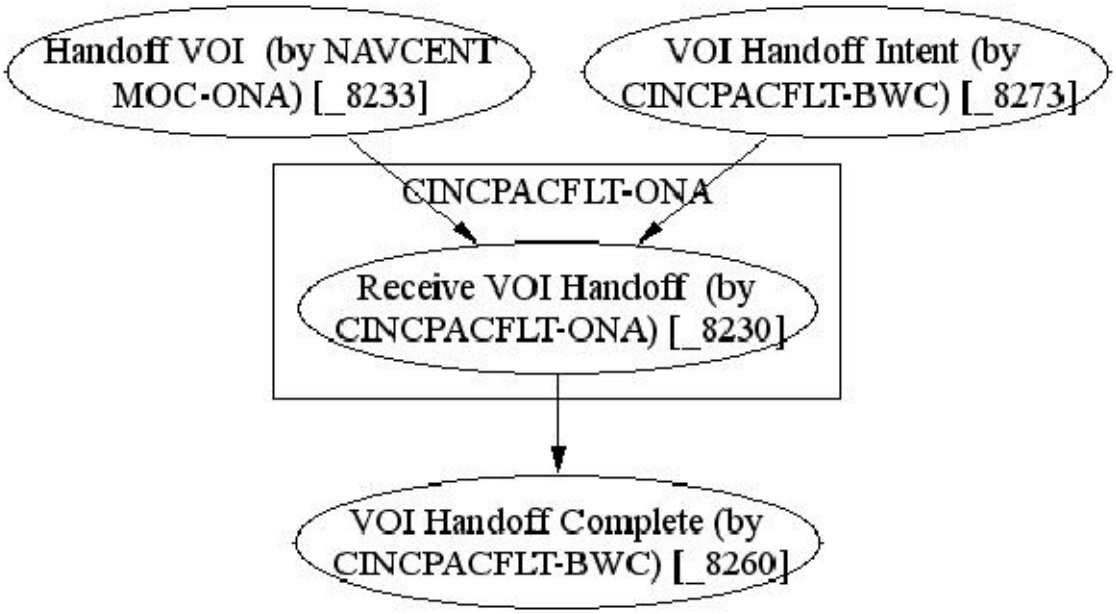
8.4.8. CINCPACFLT: BWC



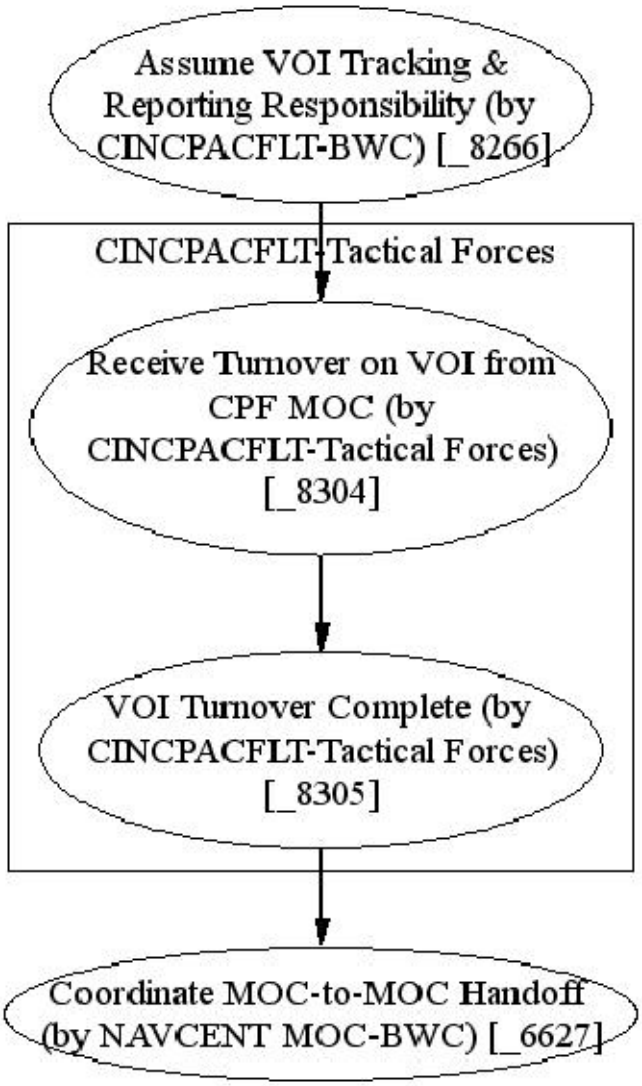
8.4.9. CINCPACFLT: COPS



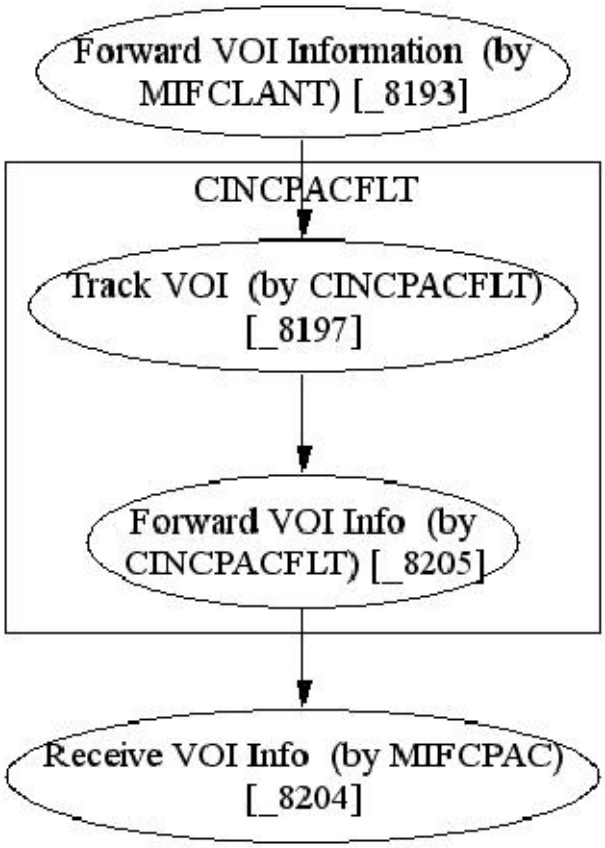
8.4.10. CINCPACFLT: ONA



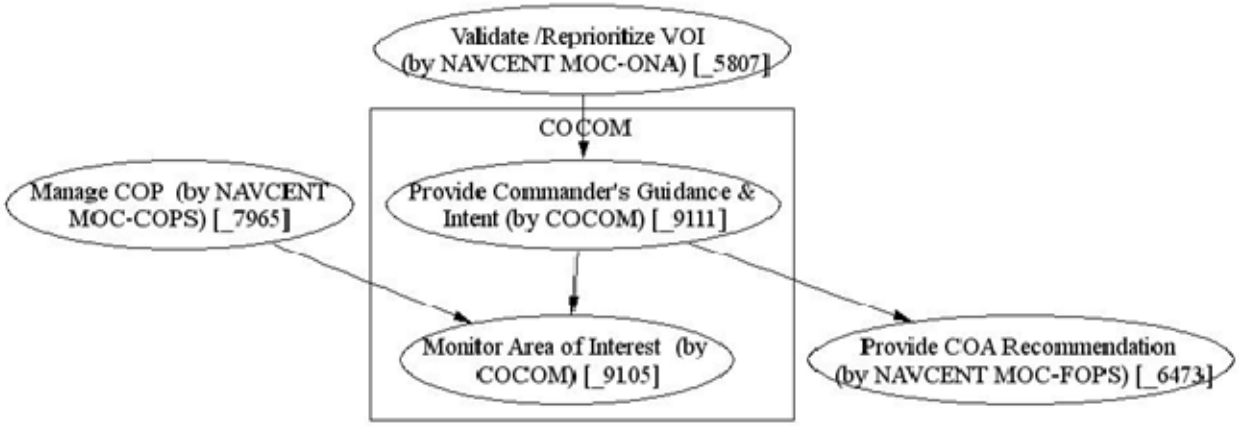
8.4.11. CINCPACFLT: Tactical Forces



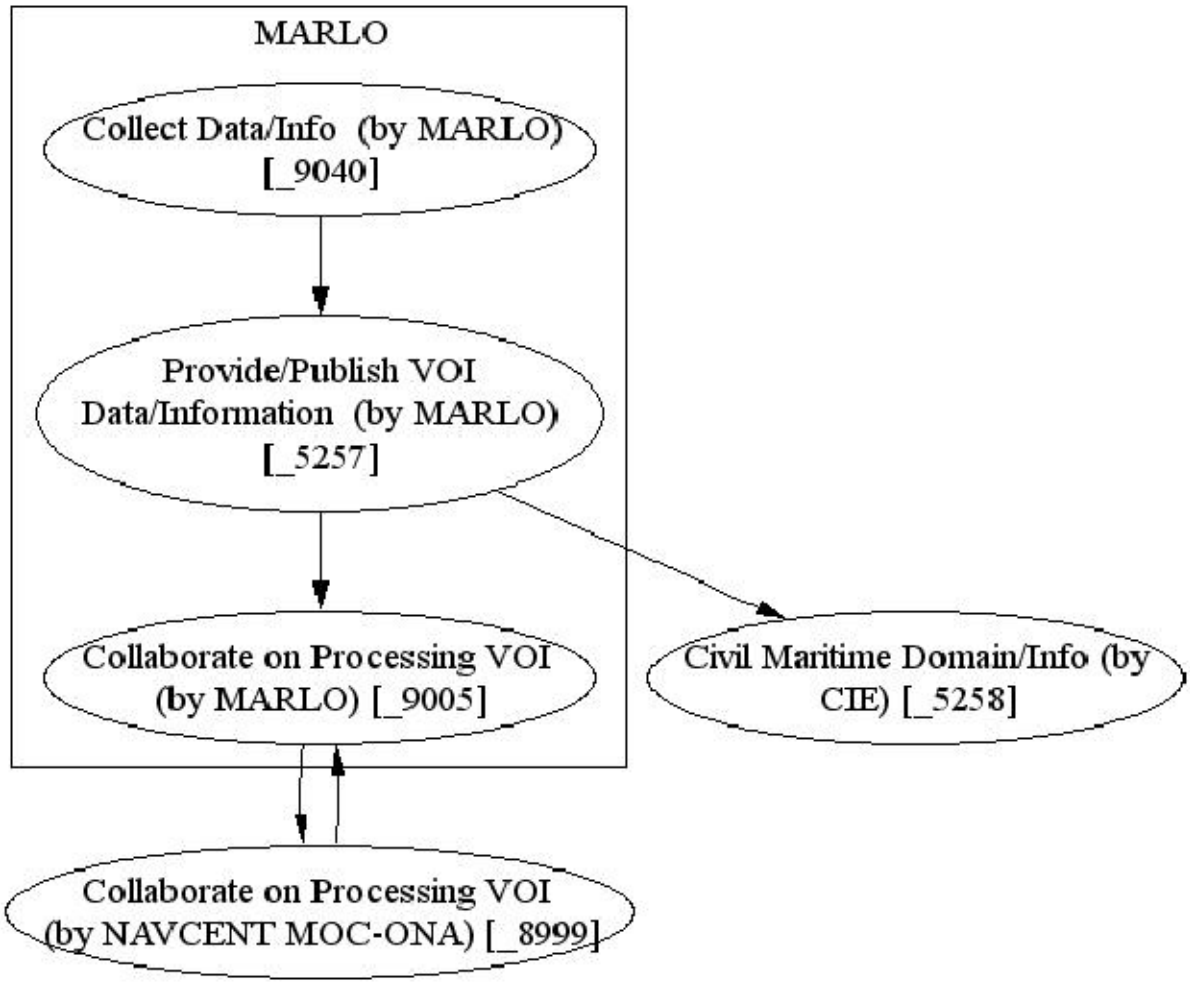
8.4.12. CINCPACFLT



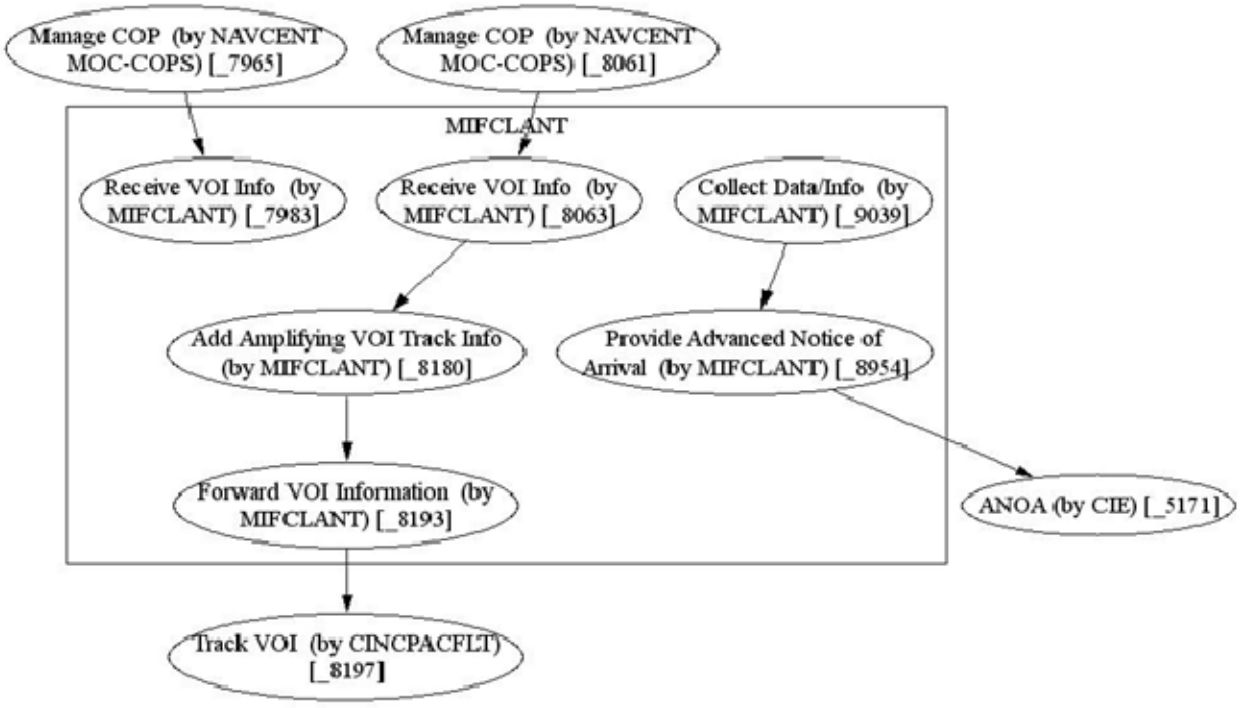
8.4.13. COCOM



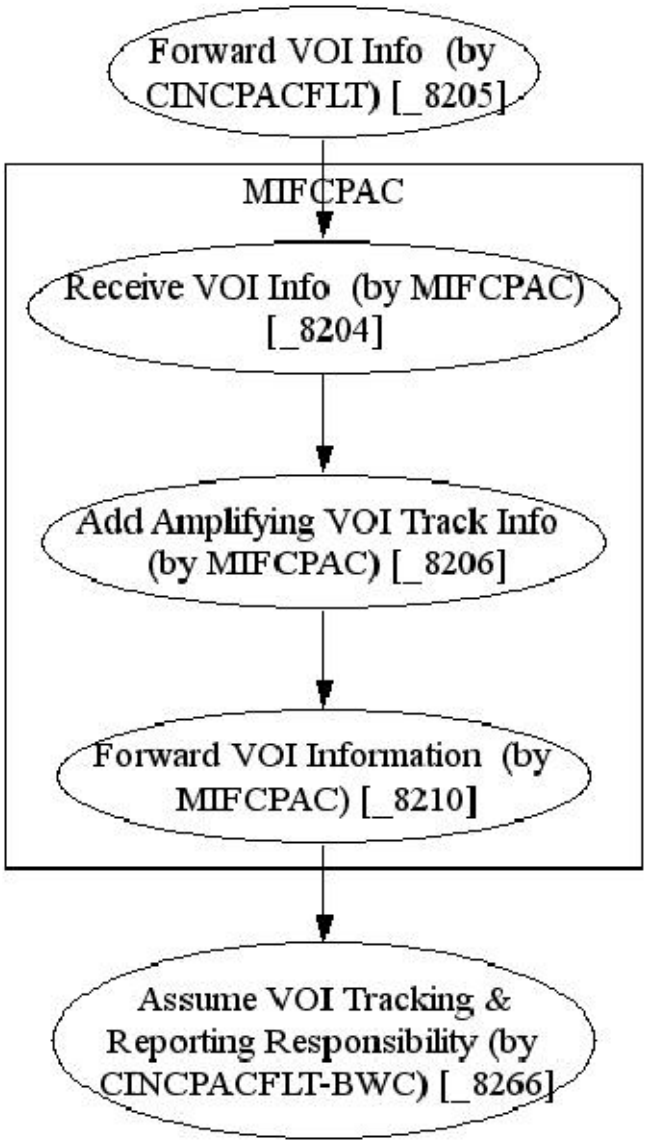
8.4.14. MARLO


MARLO
Collect Data/Info (by MARLO) [_9040]
Provide/Publish VOI Data/Information (by MARLO) [_5257]
Collaborate on Processing VOI (by MARLO) [_9005]
Civil Maritime Domain/Info (by CIE) [_5258]
Collaborate on Processing VOI (by NAVCENT MOC-ONA) [_8999]

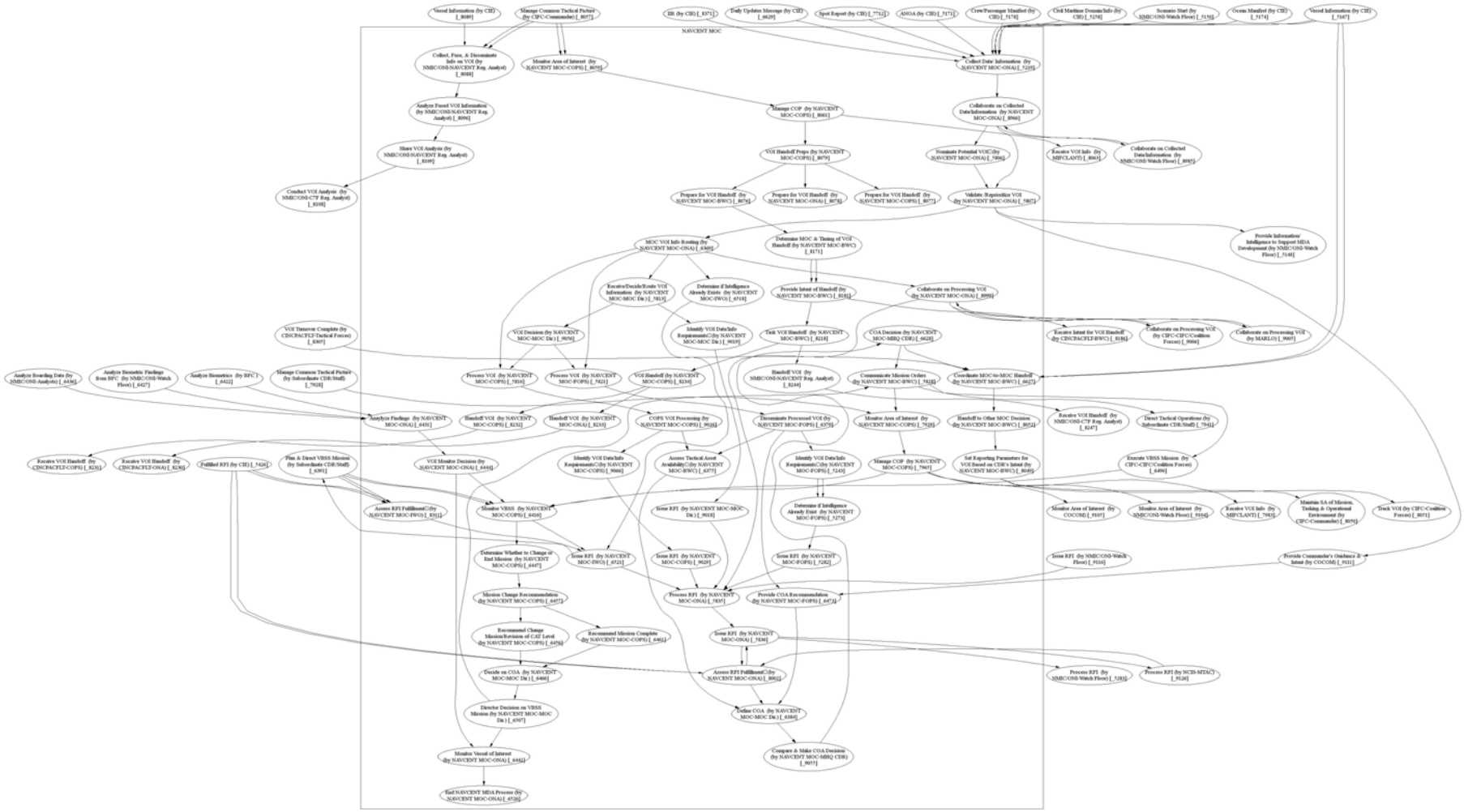
8.4.15. MIFCLANT



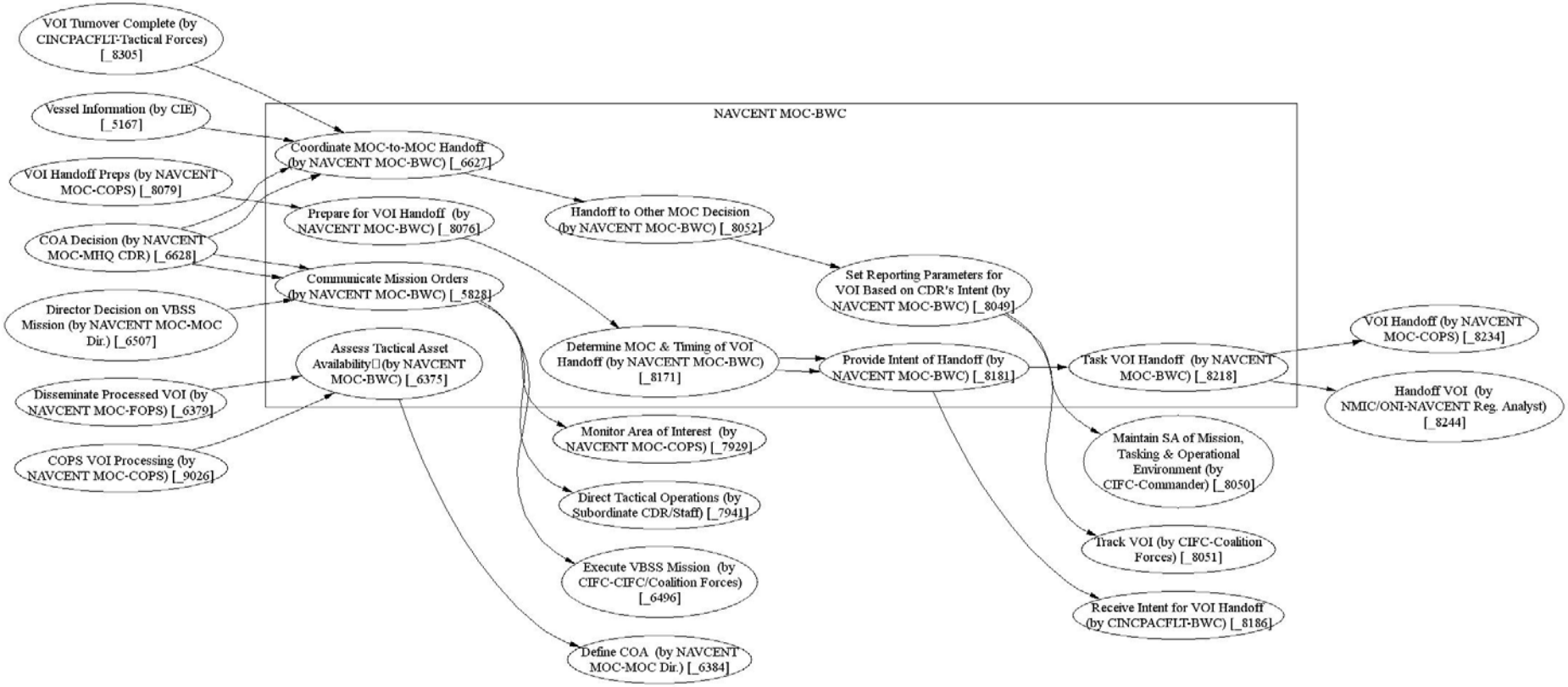
8.4.16. MIFCPAC



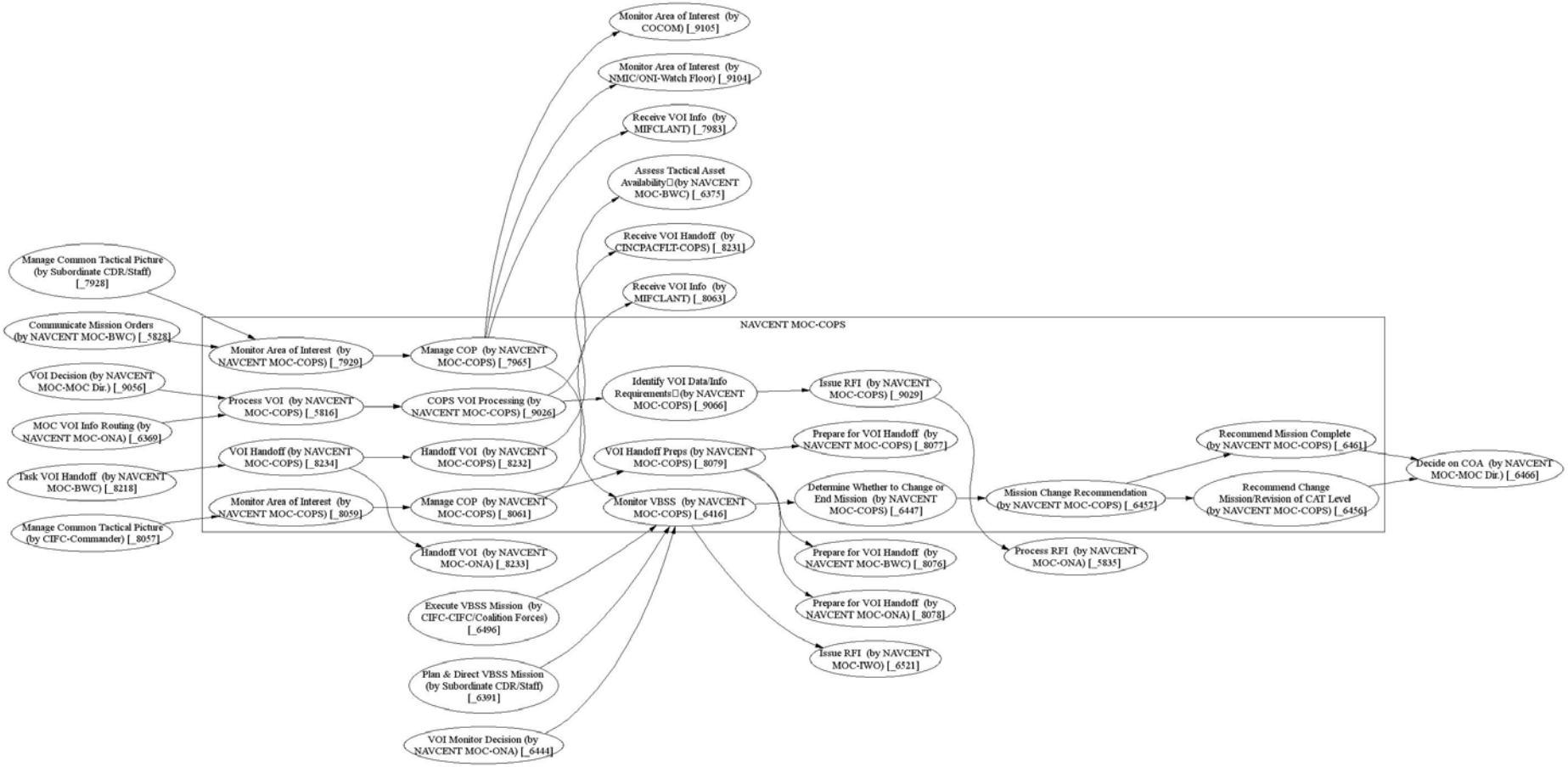
8.4.17. NAVCENT MOC Overall



8.4.18. NAVCENT MOC: BWC

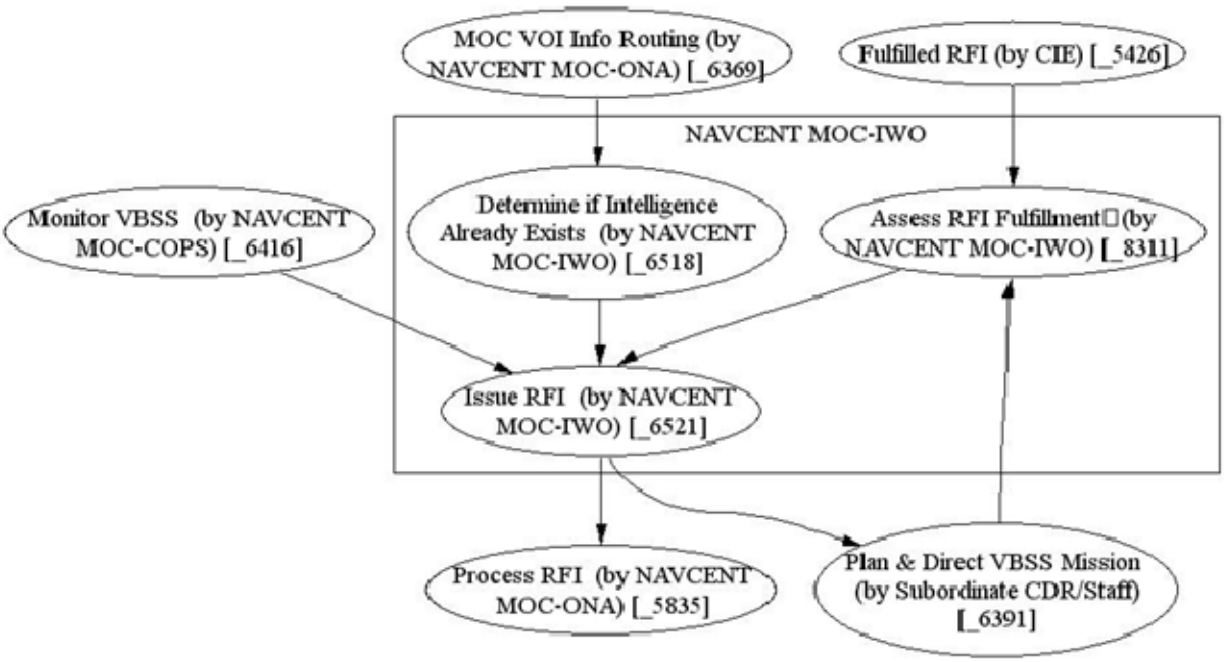


8.4.19. NAVCENT MOC: COPS

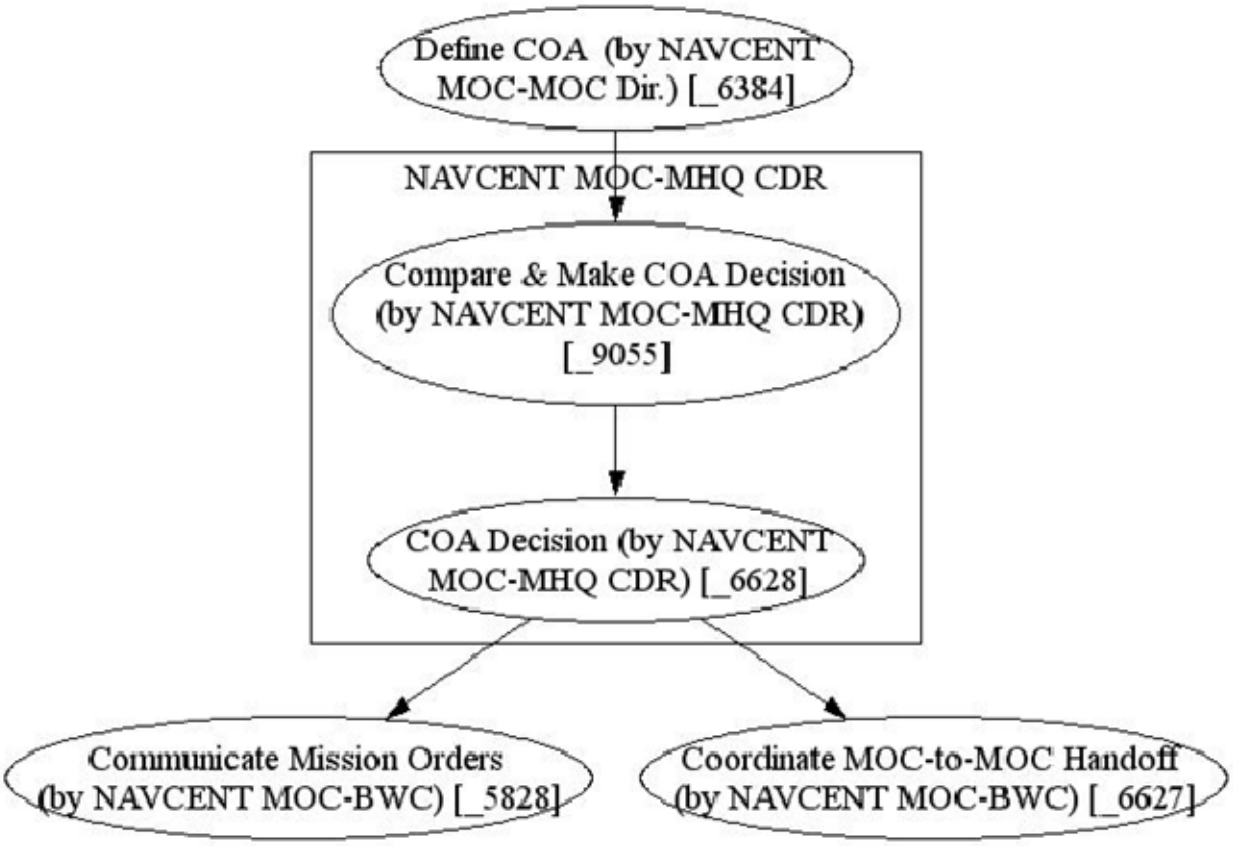


8.4.20. NAVCENT MOC: FOPS

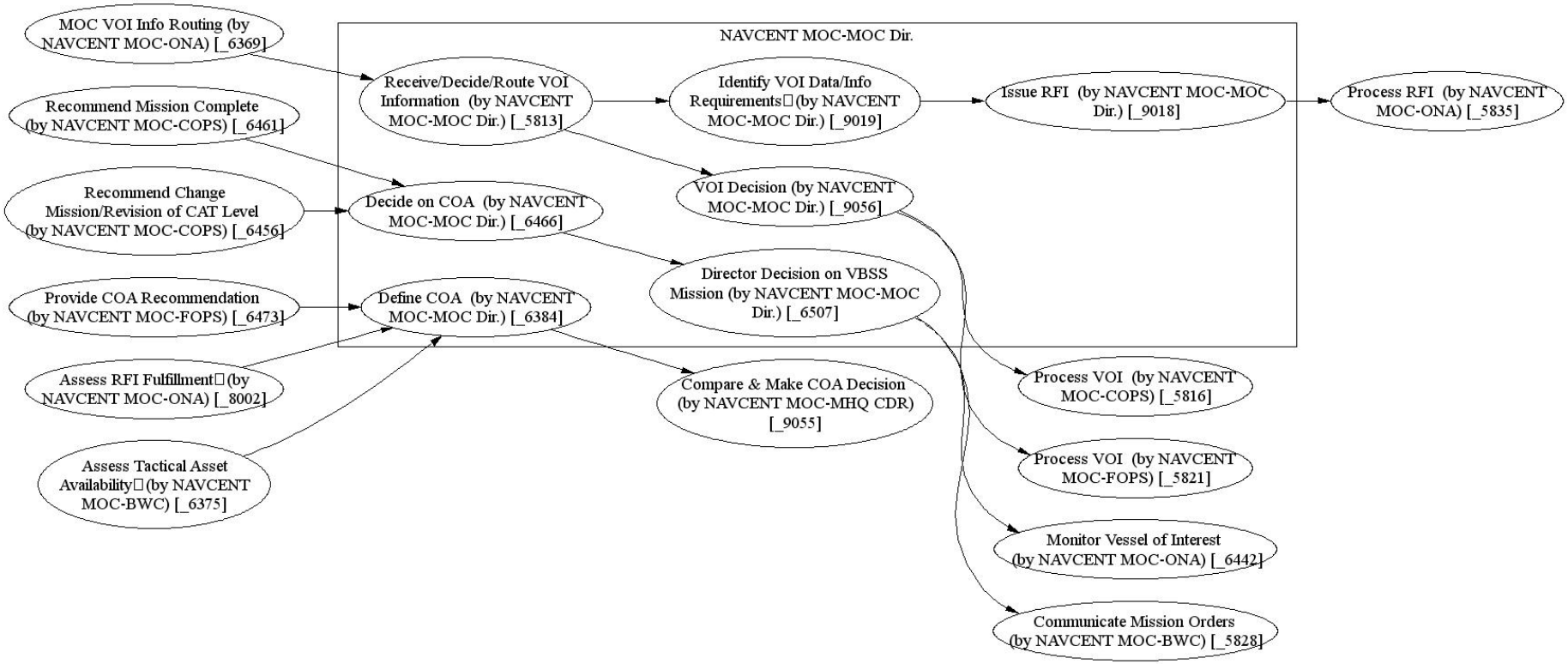
8.4.21. NAVCENT MOC: IWO



8.4.22. NAVCENT MOC: MHQ CDR

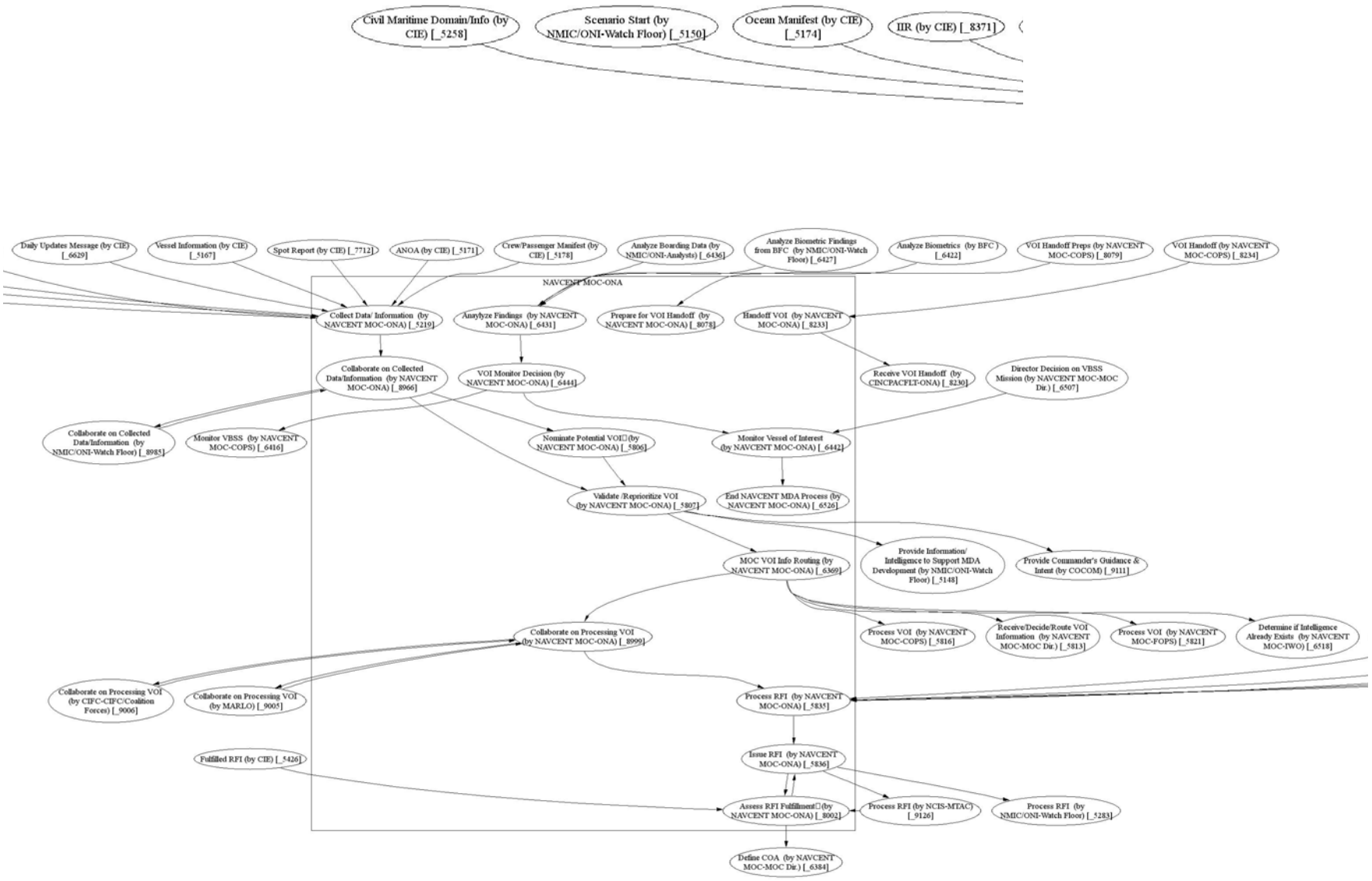


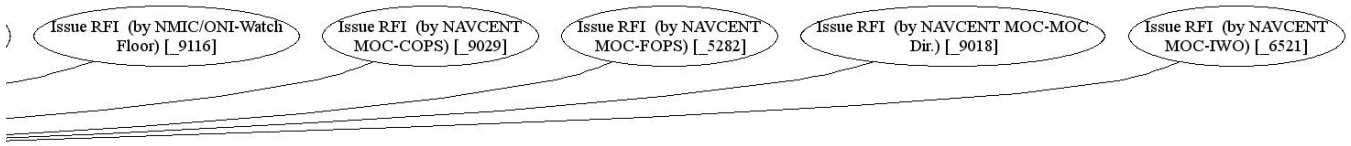
8.4.23. NAVCENT MOC: MOC Dir



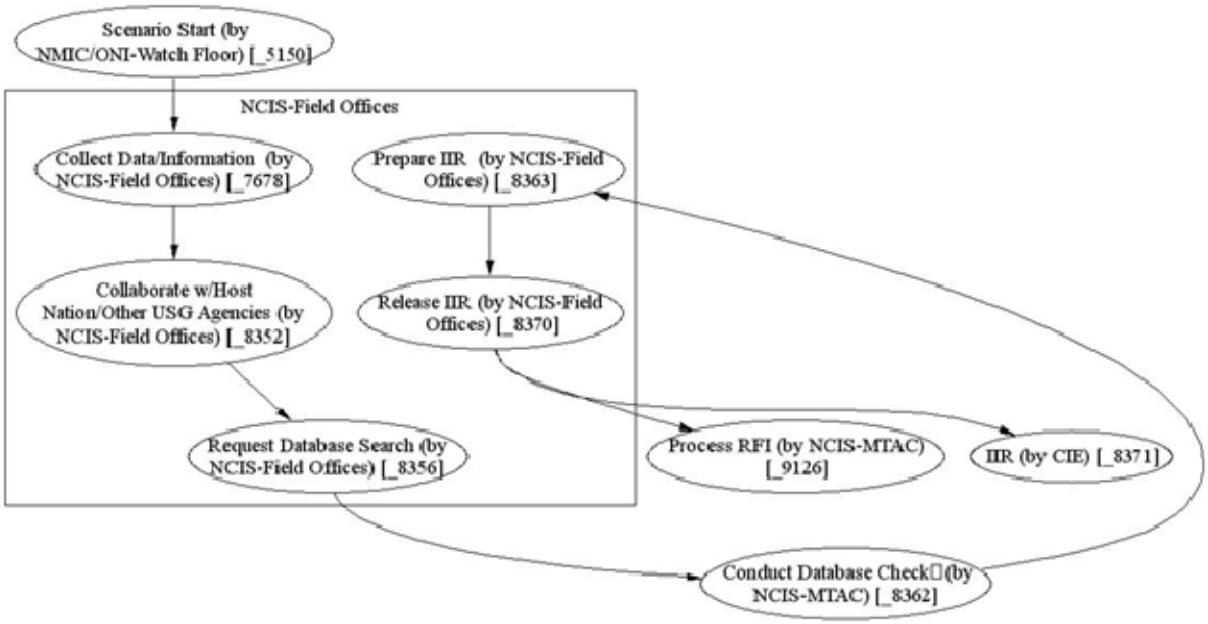
8.4.24. NAVCENT MOC: ONA

(Note: Left and right branches appear before and after the main body of the diagram)

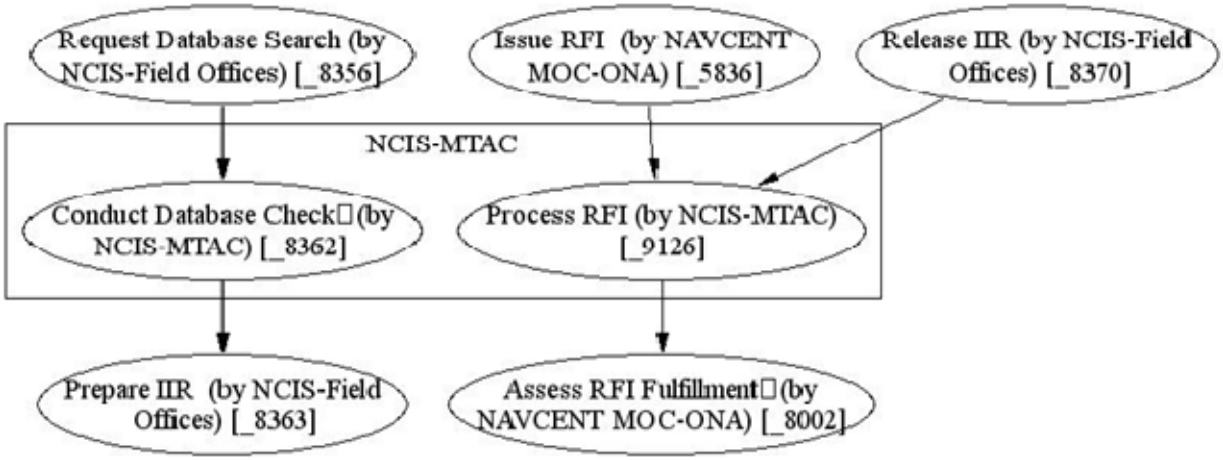



)
Issue RFI (by NMIC/ONI-Watch Floor) [_9116]
Issue RFI (by NAVCENT MOC-COPS) [_9029]
Issue RFI (by NAVCENT MOC-FOPS) [_5282]
Issue RFI (by NAVCENT MOC-MOC Dir.) [_9018]
Issue RFI (by NAVCENT MOC-IWO) [_6521]

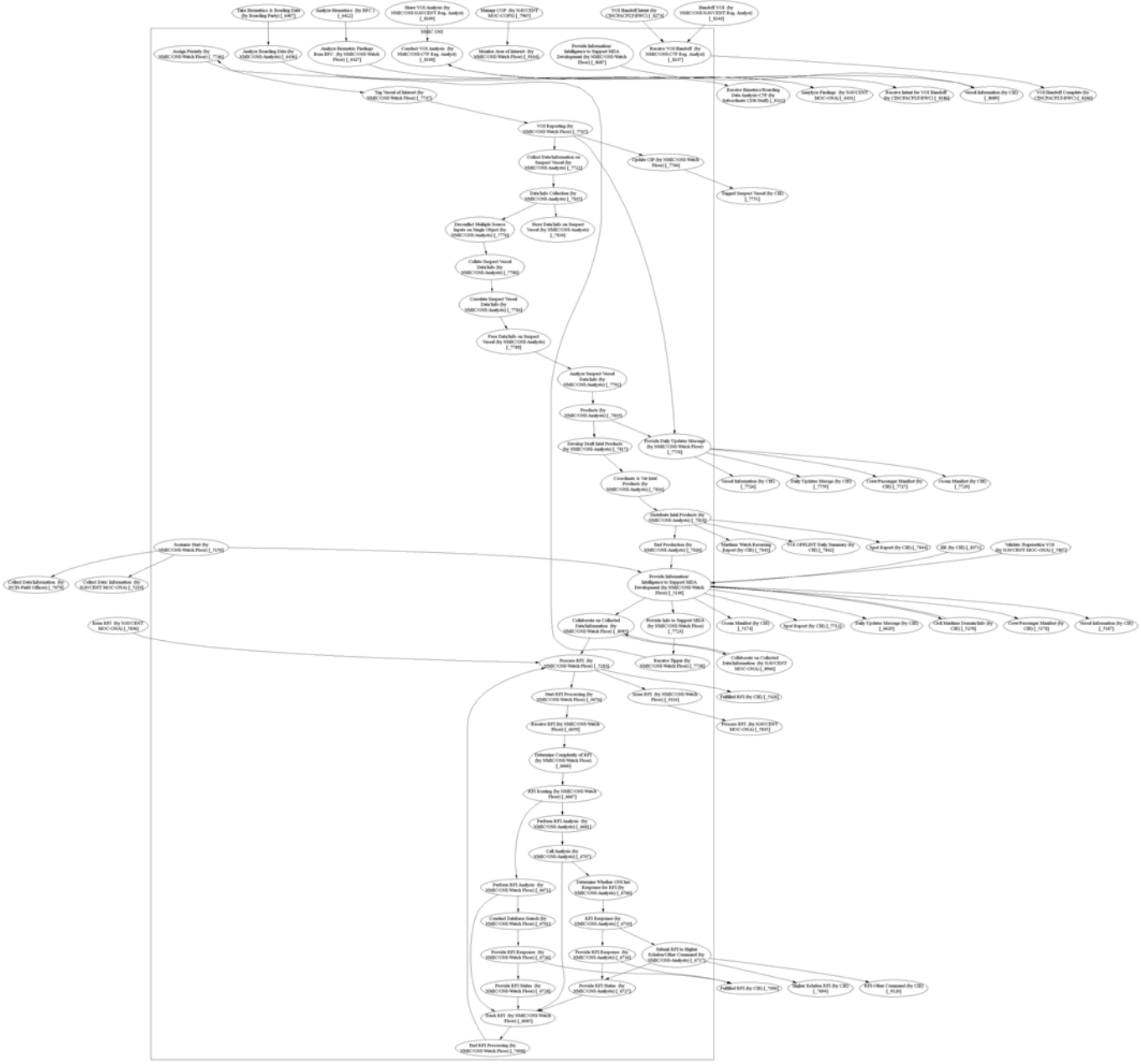
8.4.25. NCIS: Field Offices



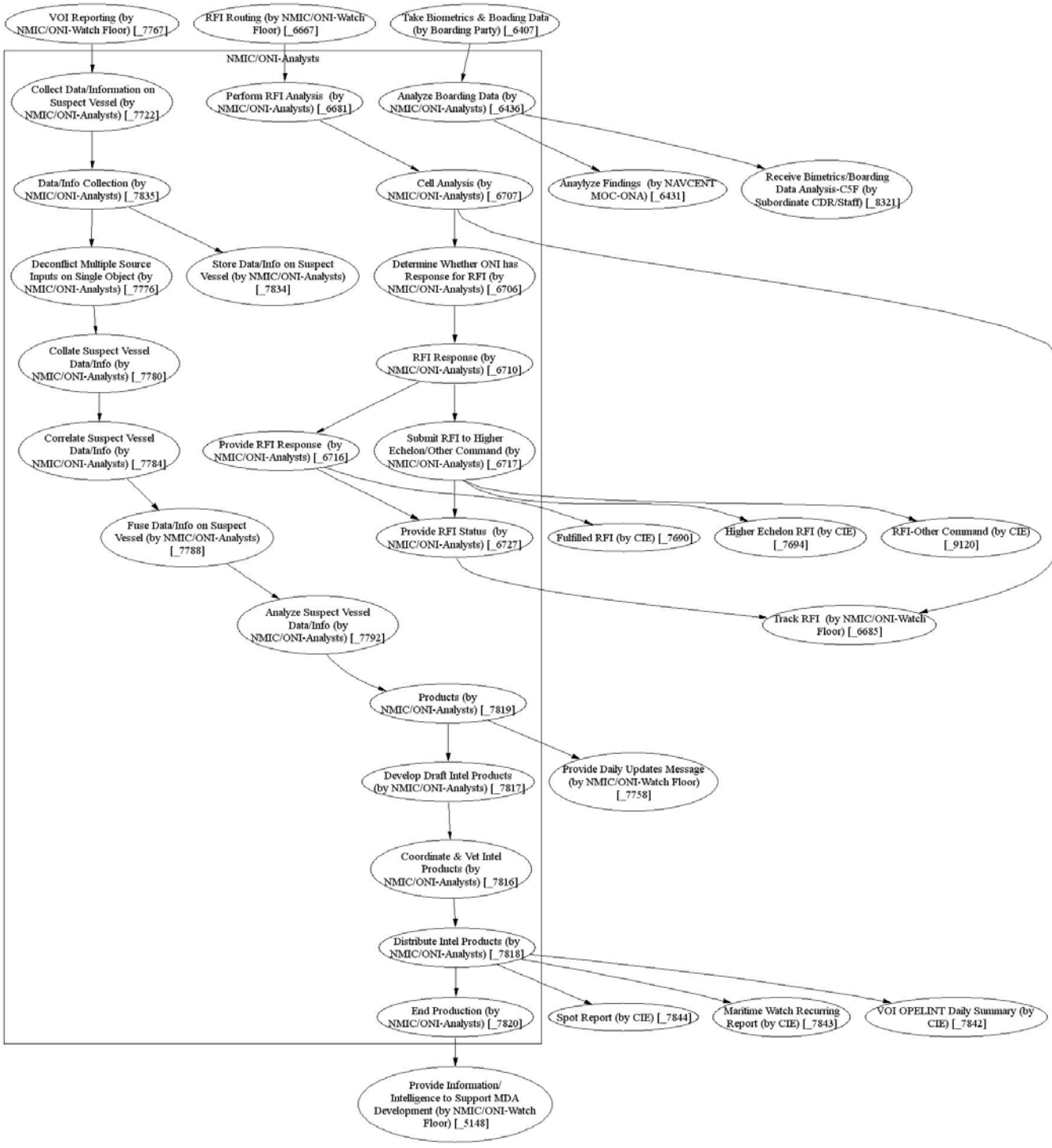
8.4.26. NCIS: MTAC



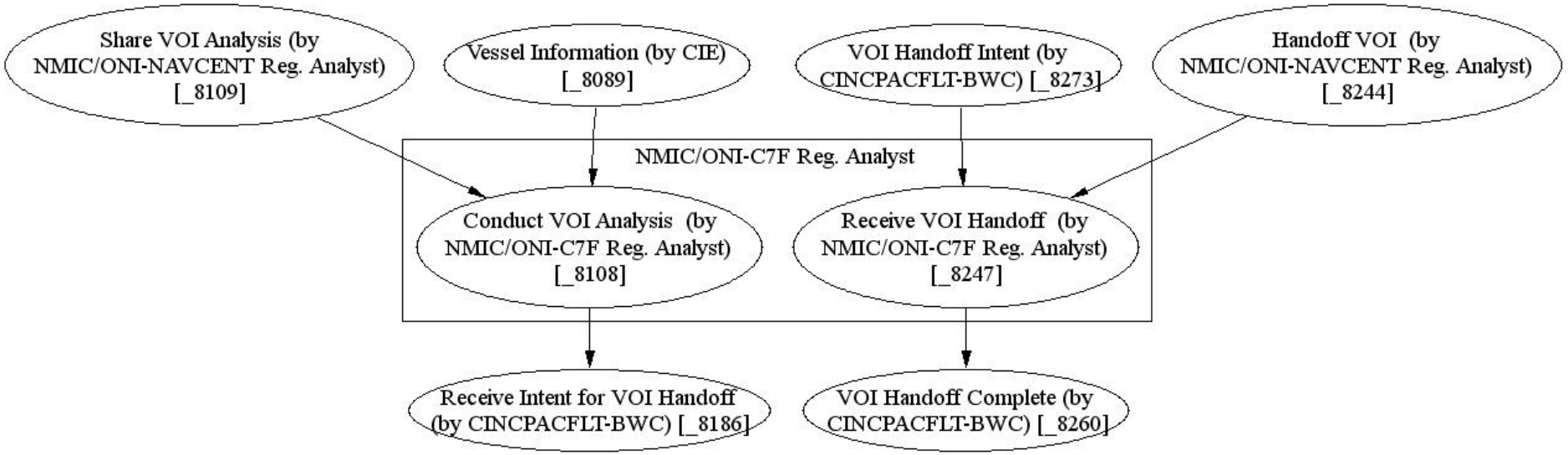
8.4.27. NMIC/ONI Overall



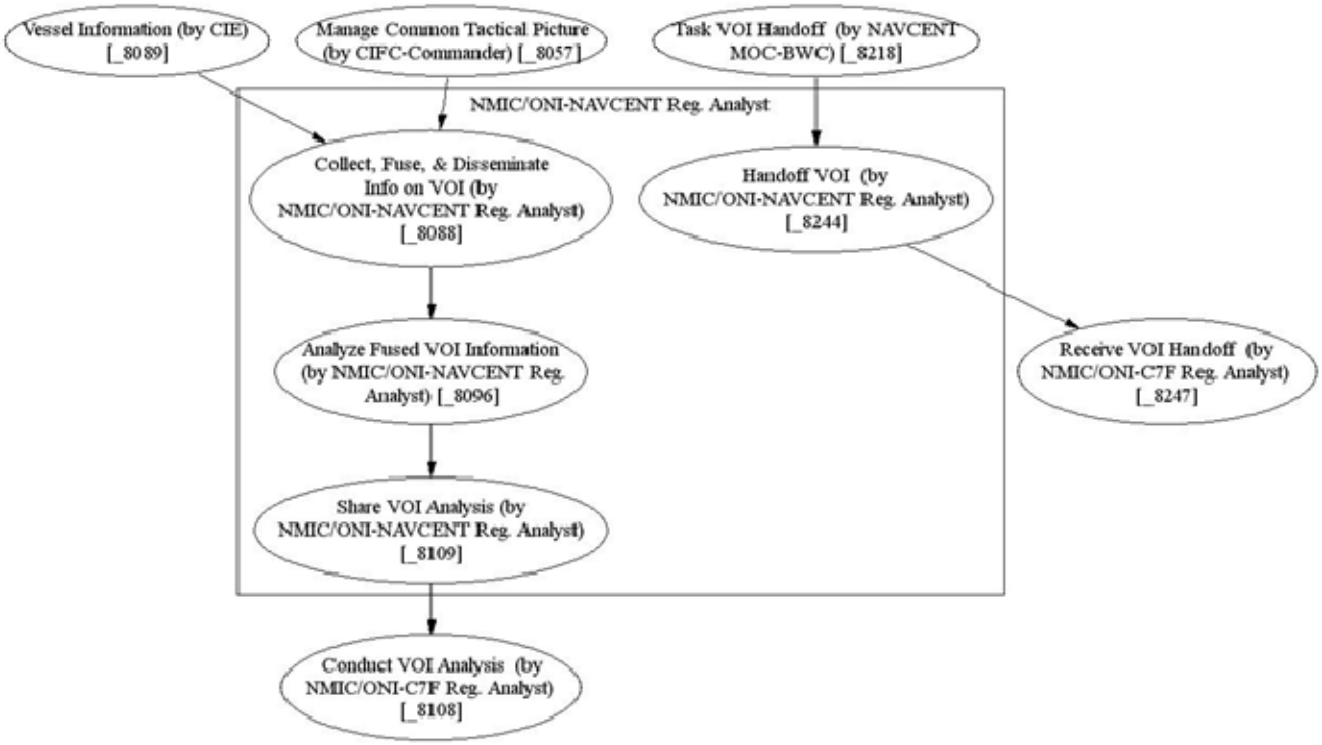
8.4.28. NMIC/ONI: Analysts



8.4.29. NMIC/ONI: C7F Regional Analyst

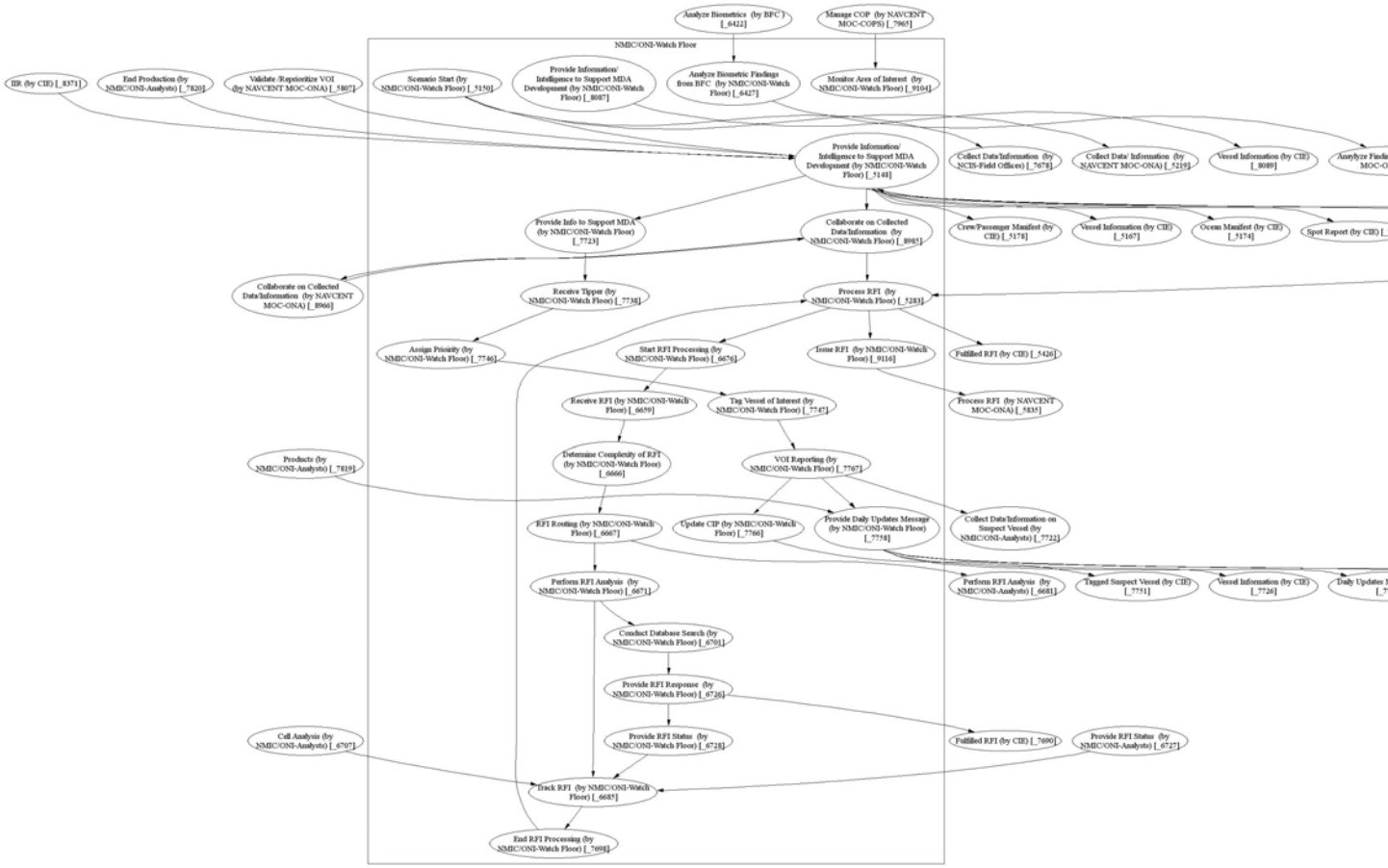


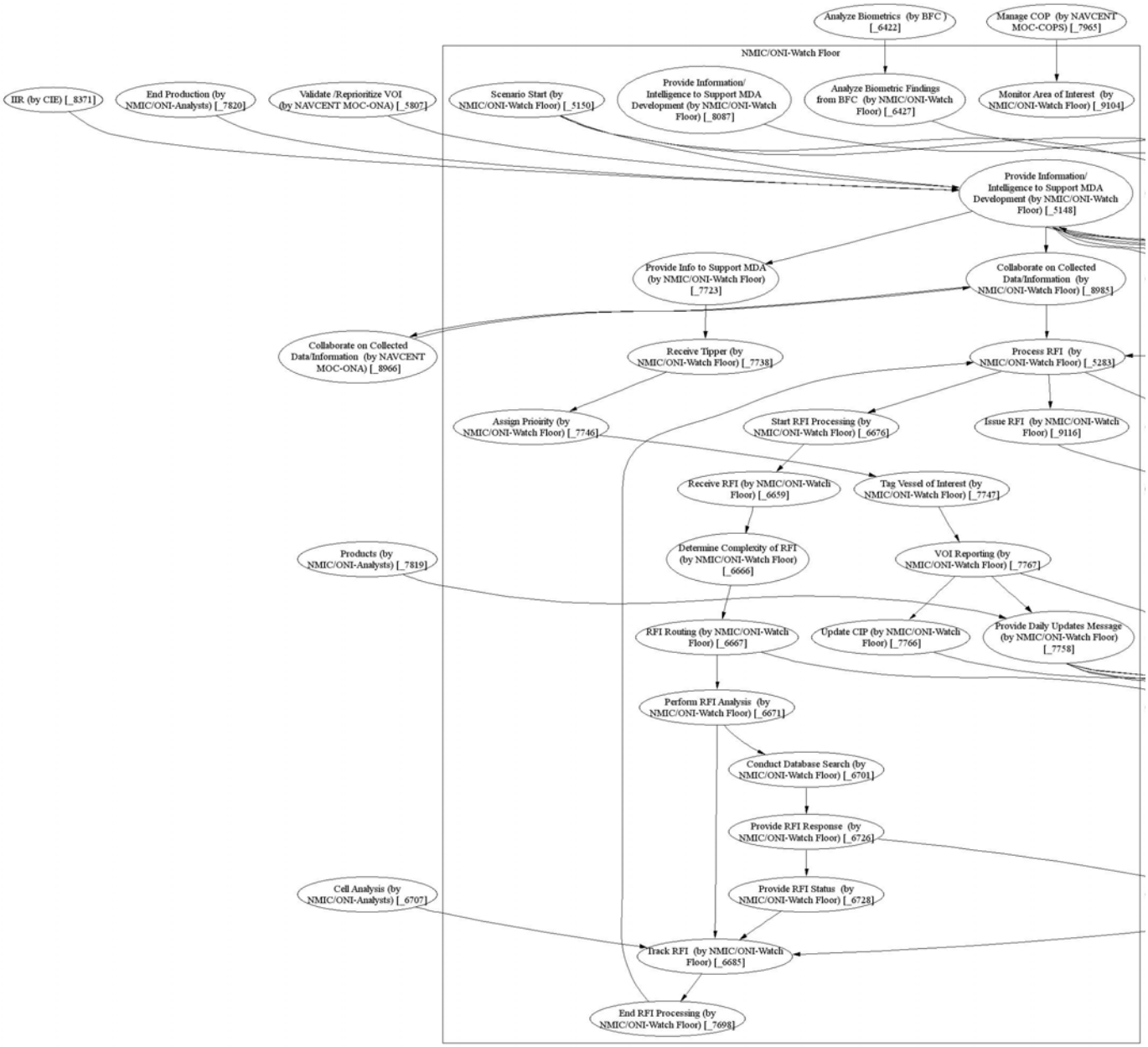
8.4.30. NMIC/ONI: NAVCENT Regional Analyst

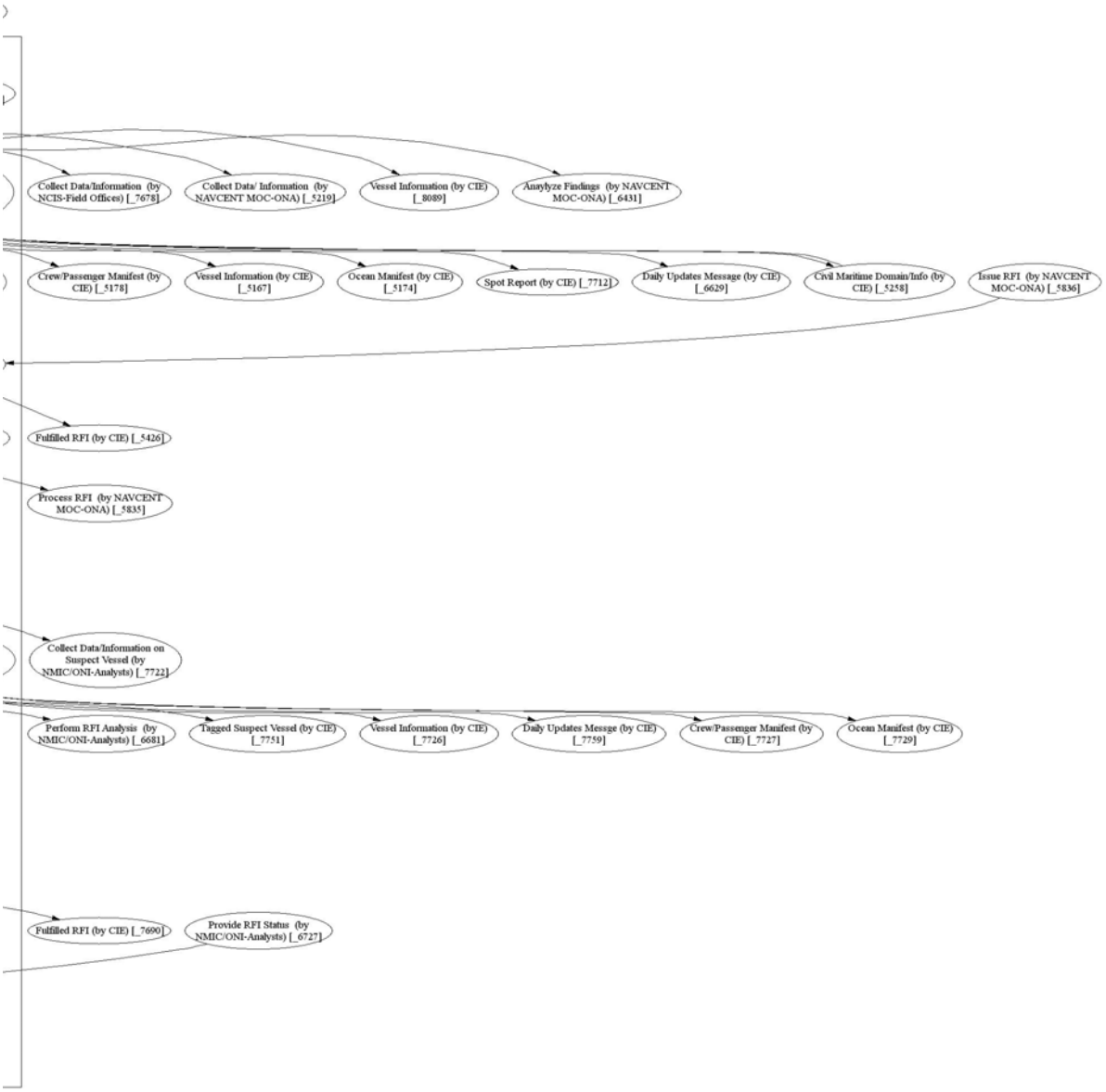


8.4.31. NMIC/ONI: Watch Floor

Note: This graph is reproduced in small but whole (this page) and large but bisected (below).

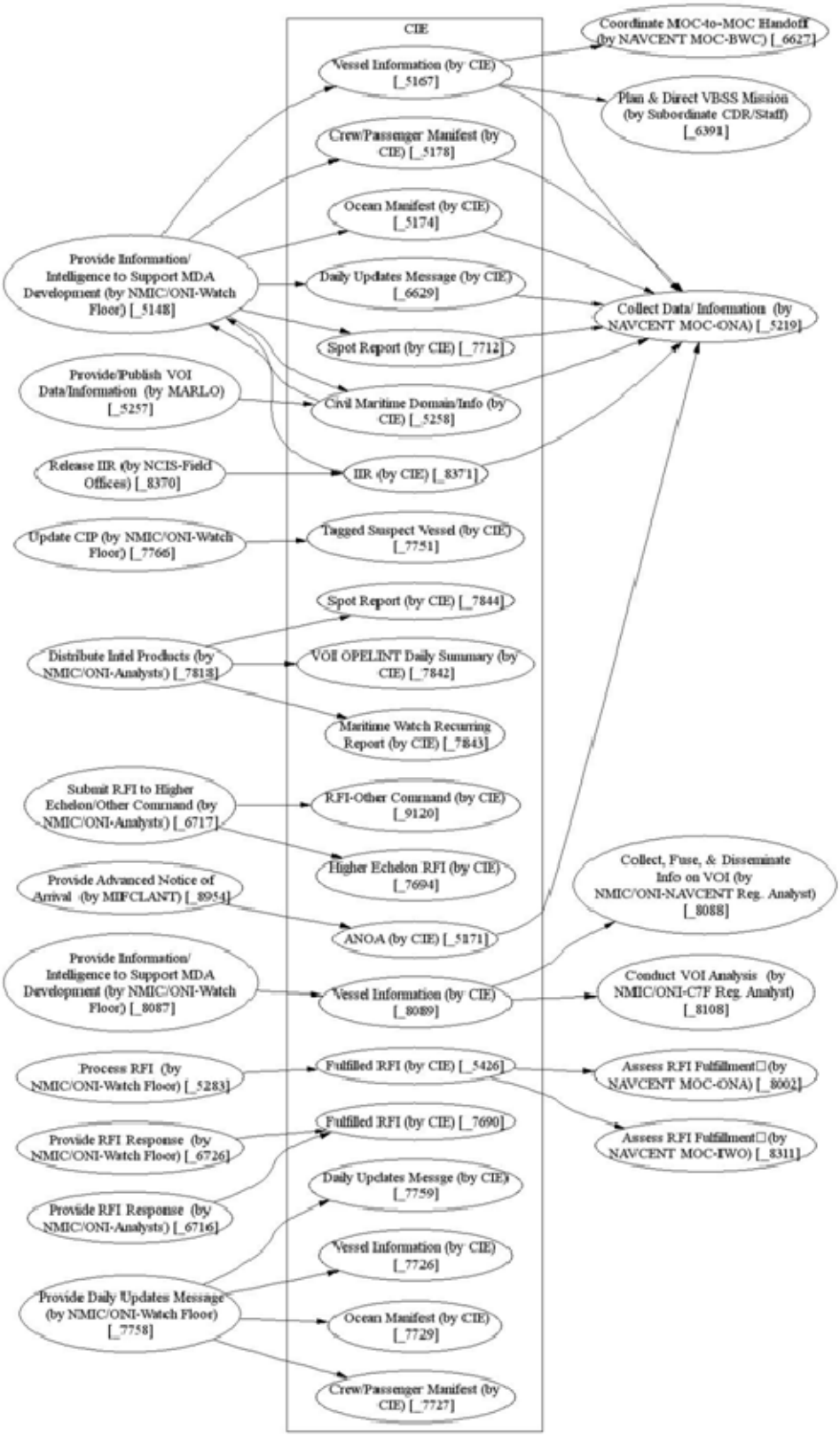



Analyze Biometrics (by BFC) [_6422]
Manage COP (by NAVCENT MOC-COPS) [_7965]
NMIC/ONI-Watch Floor
IIR (by CIE) [_8371]
End Production (by NMIC/ONI-Analysts) [_7820]
Validate /Reprioritize VOI (by NAVCENT MOC-ONA) [_5807]
Scenario Start (by NMIC/ONI-Watch Floor) [_5150]
Provide Information/ Intelligence to Support MDA Development (by NMIC/ONI-Watch Floor) [_8087]
Analyze Biometric Findings from BFC (by NMIC/ONI-Watch Floor) [_6427]
Monitor Area of Interest (by NMIC/ONI-Watch Floor) [_9104]
Provide Information/ Intelligence to Support MDA Development (by NMIC/ONI-Watch Floor) [_5148]
Provide Info to Support MDA (by NMIC/ONI-Watch Floor) [_7723]
Collaborate on Collected Data/Information (by NMIC/ONI-Watch Floor) [_8985]
Collaborate on Collected Data/Information (by NAVCENT MOC-ONA) [_8966]
Receive Tipper (by NMIC/ONI-Watch Floor) [_7738]
Process RFI (by NMIC/ONI-Watch Floor) [_5283]
Assign Priority (by NMIC/ONI-Watch Floor) [_7746]
Start RFI Processing (by NMIC/ONI-Watch Floor) [_6676]
Issue RFI (by NMIC/ONI-Watch Floor) [_9116]
Receive RFI (by NMIC/ONI-Watch Floor) [_6659]
Tag Vessel of Interest (by NMIC/ONI-Watch Floor) [_7747]
Products (by NMIC/ONI-Analysts) [_7819]
Determine Complexity of RFI (by NMIC/ONI-Watch Floor) [_6666]
VOI Reporting (by NMIC/ONI-Watch Floor) [_7767]
RFI Routing (by NMIC/ONI-Watch Floor) [_6667]
Update CIP (by NMIC/ONI-Watch Floor) [_7766]
Provide Daily Updates Message (by NMIC/ONI-Watch Floor) [_7758]
Perform RFI Analysis (by NMIC/ONI-Watch Floor) [_6671]
Conduct Database Search (by NMIC/ONI-Watch Floor) [_6701]
Provide RFI Response (by NMIC/ONI-Watch Floor) [_6726]
Cell Analysis (by NMIC/ONI-Analysts) [_6707]
Provide RFI Status (by NMIC/ONI-Watch Floor) [_6728]
Track RFI (by NMIC/ONI-Watch Floor) [_6685]
End RFI Processing (by NMIC/ONI-Watch Floor) [_7698]


Collect Data/Information (by NCIS-Field Offices) [_7678]
Collect Data/ Information (by NAVCENT MOC-ONA) [_5219]
Vessel Information (by CIE) [_8089]
Anaylyze Findings (by NAVCENT MOC-ONA) [_6431]
Crew/Passenger Manifest (by CIE) [_5178]
Vessel Information (by CIE) [_5167]
Ocean Manifest (by CIE) [_5174]
Spot Report (by CIE) [_7712]
Daily Updates Message (by CIE) [_6629]
Civil Maritime Domain/Info (by CIE) [_5258]
Issue RFI (by NAVCENT MOC-ONA) [_5836]
Fulfilled RFI (by CIE) [_5426]
Process RFI (by NAVCENT MOC-ONA) [_5835]
Collect Data/Information on Suspect Vessel (by NMIC/ONI-Analysts) [_7722]
Perform RFI Analysis (by NMIC/ONI-Analysts) [_6681]
Tagged Suspect Vessel (by CIE) [_7751]
Vessel Information (by CIE) [_7726]
Daily Updates Messge (by CIE) [_7759]
Crew/Passenger Manifest (by CIE) [_7727]
Ocean Manifest (by CIE) [_7729]
Fulfilled RFI (by CIE) [_7690]
Provide RFI Status (by NMIC/ONI-Analysts) [_6727]

8.4.32. Subordinate Commander & Staff

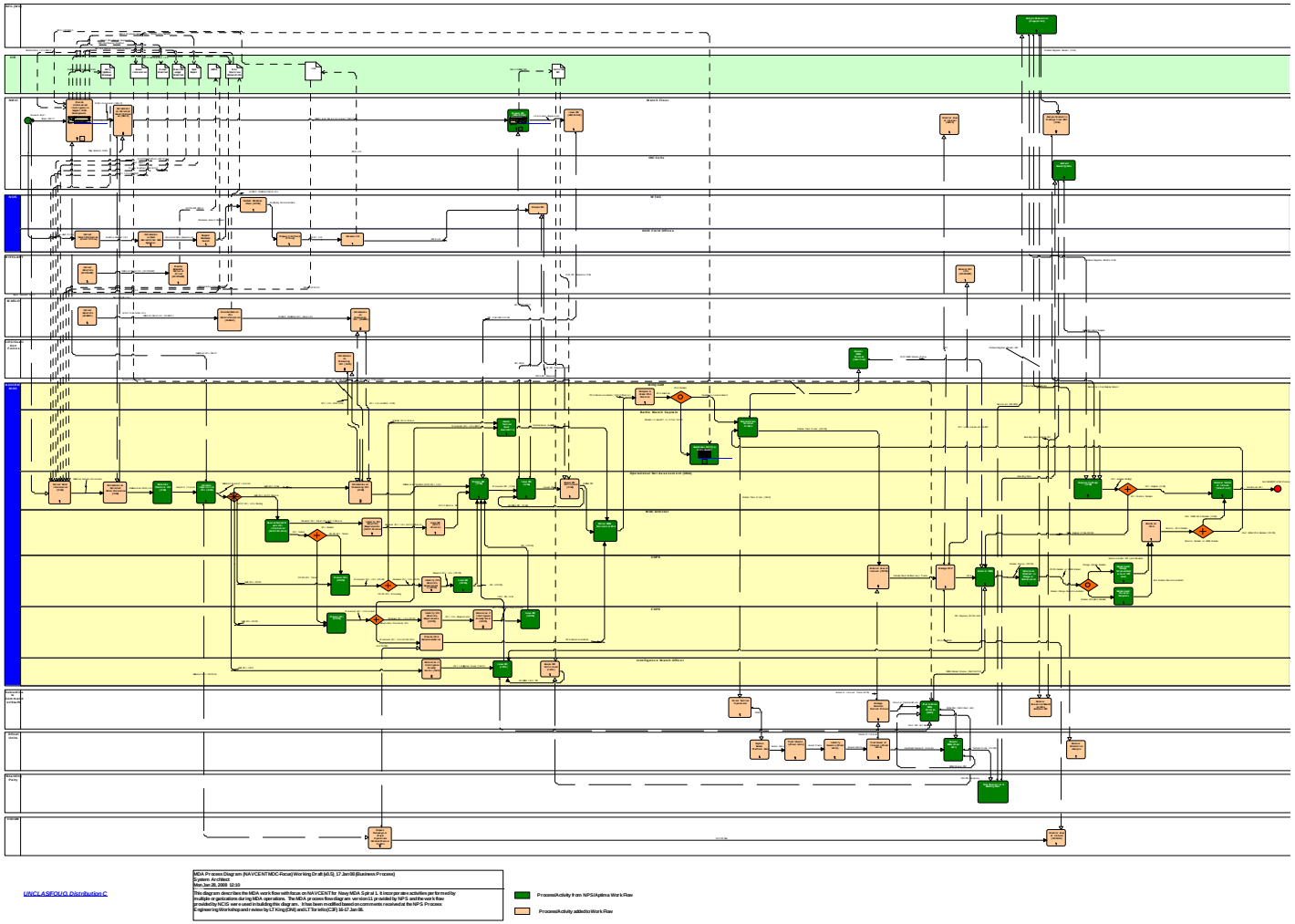
8.4.33. Collaborative Information Environment



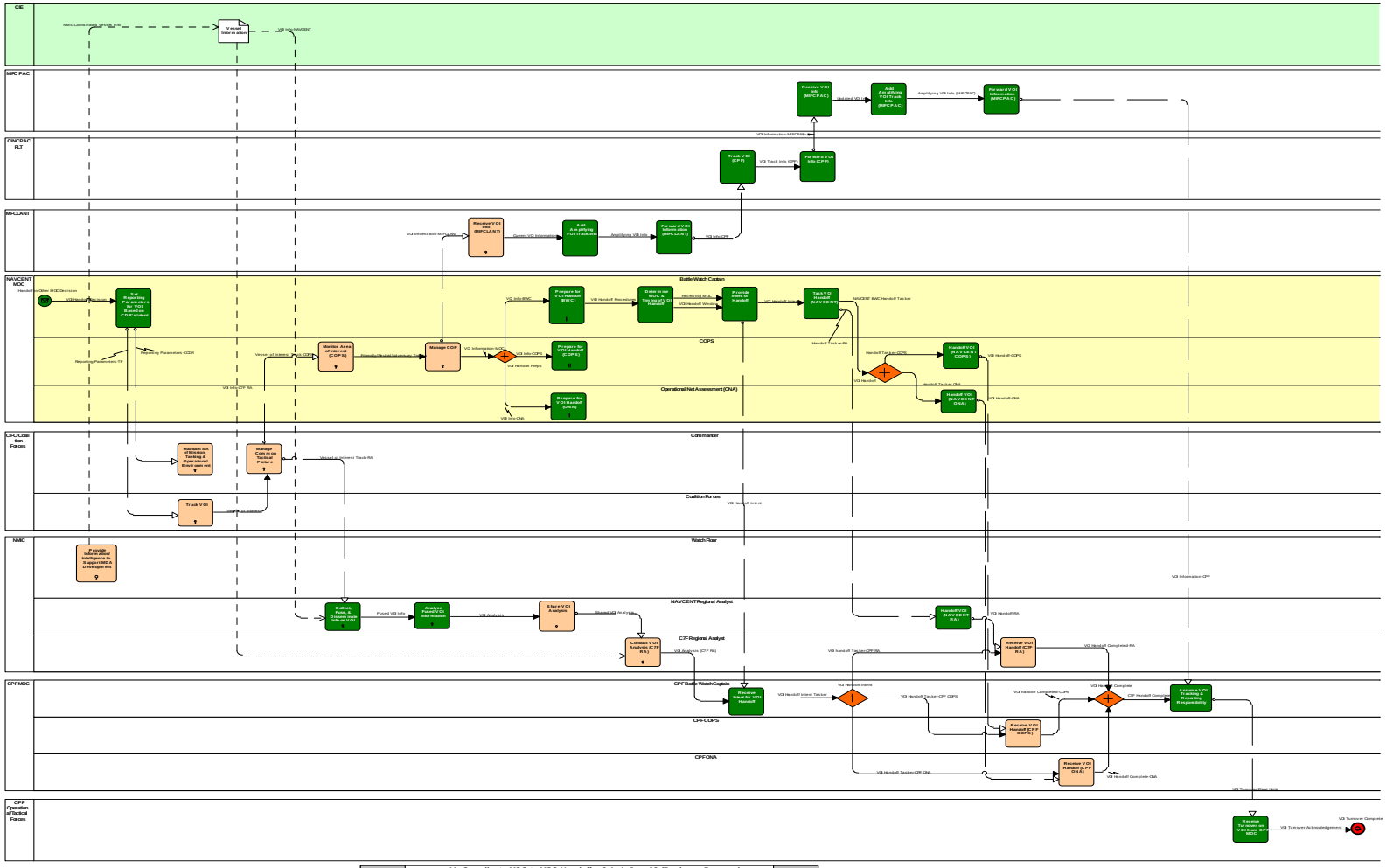
8.5. OV-6c

The following diagrams are drawn from a slide set generated by WBB for NETWARCOM for the Process Alignment Workshop on 28 January 2008. The reader can view these detailed images by expanding them (select and drag the corners) and zooming the view. These images are enhanced metafiles that should port well to MicroSoft applications for better viewing.

8.5.1. Top Level Process



8.5.2. Coordinate Handoff



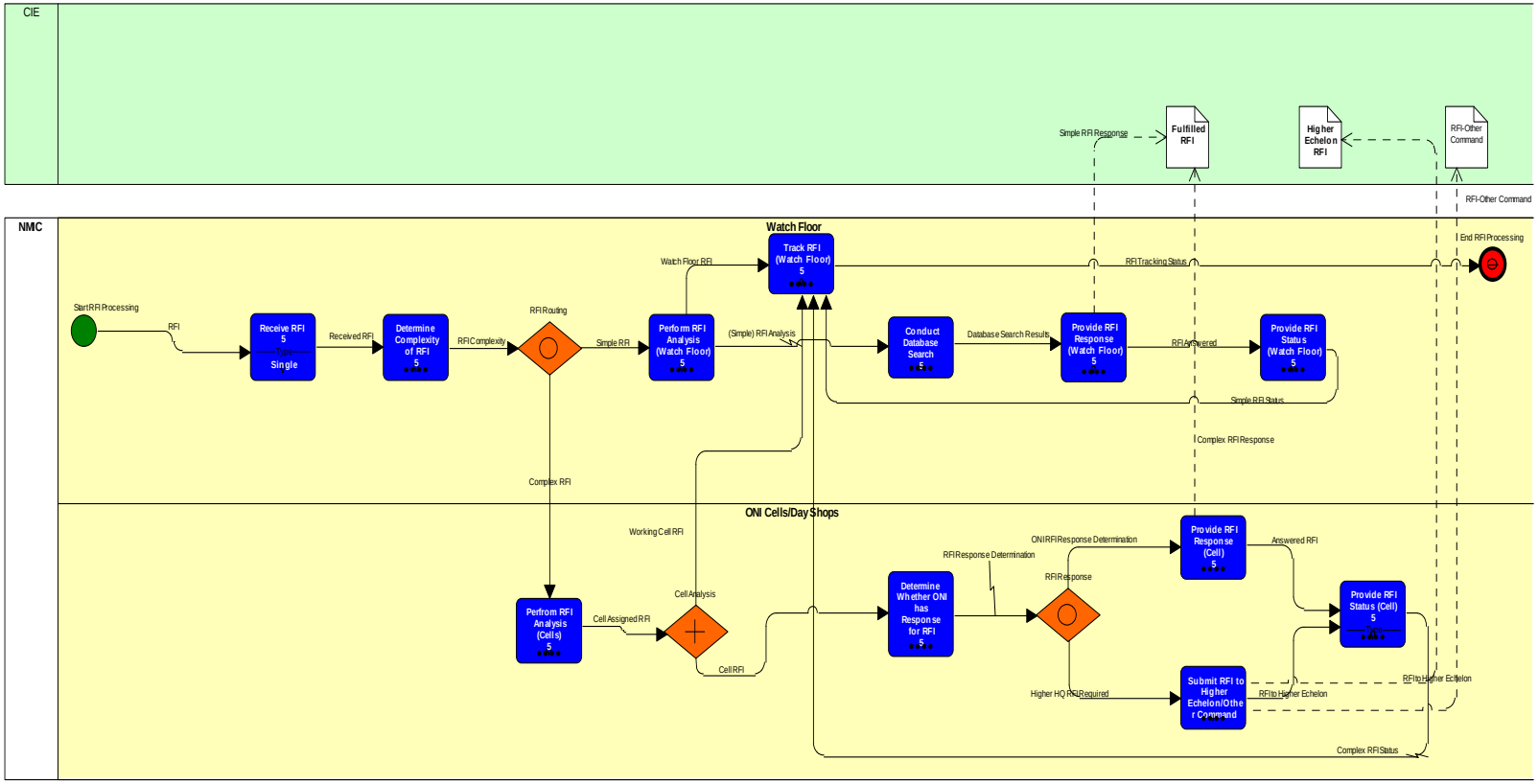
41. Coordinate MOC-to-MOC Handoff_v 0.1_4_Jan_08 (Business Process)
System Architect
Mon Jan 28, 2008 12:40

This diagram describes the procedures for handing ov er tracking and reporting responsibilities of a VOI from one area of responsibility to another. This diagram was developed based on the NPS MDA Workflow diagram v ersion 11 and the Process Engineering Workshop scenario ov erv iew. This diagram is a child diagram of the NAVCENT MDA As-is Process diagram.

Process/Activ ity from NPS/Aptima Work Flow

Process/Activ ity added to Work Flow

8.5.3. Process RFI



10. Process RFI (NMC/ONI)_v 0.2_17 Jan 08 (Business Process)
System Architect
Wed Jan 23, 2008 12:43
-Comment-
This diagram describes the draft ONI process for handling RFIs as provided in notes form APTIMA based on discussions between Jared Freeman and ONI representatives Jim Stallings, LT Lange and Paul Carroll. It was also reviewed by ONI rep LT King at the Process Engineering Workshop on 17 JAN at NPS Monterey. No required changes were identified.

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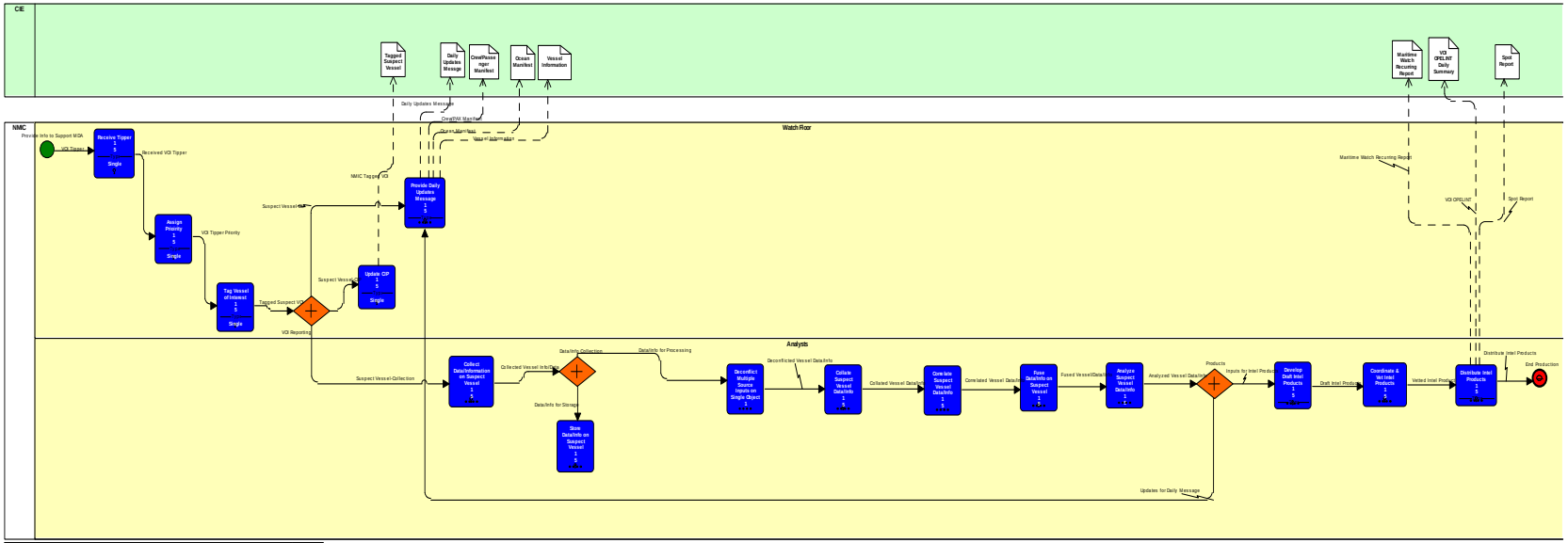
8.5.4. Provide Info/Intel



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